



# **UNDP Project Document**

Government of Ecuador

United Nations Development Programme

The Ministry of Environment

Adaptation to Climate Change through Effective Water Governance in Ecuador

## **Brief description**

The project objective is to reduce Ecuador's vulnerability to climate change through effective water resource management. The project will mainstream climate change adaptation into water management practices in Ecuador through the integration of climate change risk of the water sector into key national and local development plans, the implementation of adaptation measures, and information management and knowledge brokering.

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## Acronyms

ALM	Adaptation Learning Mechanism
AME	Association of Ecuadorian Municipalities
APF	Adaptation Policy Framework
APR	Annual Project Report
AWP	Annual Work Plan
CAMAREN	Consortium to Capacitate in Natural Renewable Resources Management
CBA	Community-Based Adaptation Programme
CC	Climate Change
CCCS	Country Climate Change Study
CC:TRAIN:	Training Programme in Climate Change
CDR	Regional Development Corporations
CG-PAUTE	Water Management Council for the Paute Watershed
CEDENMA	Ecuadorian Committee for the Defense of the Environment
CEDEX	Spanish Center for Public Works Studies and Research (Centro de Estudios y Experimentación de Obras Públicas de España)
CIIFEN	International Center for Research on the El Niño Phenomenon
CNC	National Climate Committee
CNRH	National Council of Hydrologic Resources
CO	Country Office
CONCOPE	Consortium of Provincial Council of Ecuador
CONESUP	National Council of Higher Education
CORDELIM	National Clean Development Mechanism Promotion Office
GDP	Gross Domestic Product
ENSO	El Niño-Southern Oscillation
EPA	Ecuador Climate Change Country Study
ESPOL	Coastal Polytechnic School
FNC	First National Communication to the UNFCCC
FRH	Water Resources Forum
FONAG	The Water Fund
GEF	Global Environment Facility
GWP	The Global Water Partnership
IDB	Inter-American Development Bank
INAMHI	National Institute of Meteorology and Hydrology
INERHI	National Institute of Hydrologic Resources
INOCAR	Navy's Oceanographic Institute
IR	Inception Report
IRD	Institute for Research and Development
IW	Inception Workshop
LDCF	Least Developing Countries' Fund
MEC	Ministry of Education
MoA	Ministry of Agriculture
M&E	Monitoring and Evaluation
MEM	Ministry of Energy and Mines
MMRREE	Ministry of External Affairs
MoE	Ministry of Environment

MSP	Medium-sized Project
NCSA	National Capacity Self Assessment
NGO	Non-Governmental Organizations
PCCE	Climate Change Process in Ecuador Project
PIR	Project Implementation Review
PMRC	Coastal Resources Management Project Phase II
PNRHE	National Plan for Water Resources
RING	Regional and International Networking Group
SCCF	Special Climate Change Fund
SEI	Stockholm Environment Institute
SENPLADES	National Secretary for Planning and Development
SIGAGRO	Farming and Geographical Information System
SNC	Second National Communication to the UNFCC
SPA	Strategic Priority on Adaptation
STAP	Scientific and Technical Advisory Panel
ToR	Terms of Reference
TPR	Tri-partite Review
TTR	Terminal Tri-partite Review
UN	United Nations
UNDP	United Nations Development Programme
UNDAF	United Nations Development and Assistance Framework
UNEP	United Nations Environmental Programme
UNEP-RISO	UNEP's Programme for Offsetting of Greenhouse Gases emissions in Ecuador
UNFCCC	United Nations Framework Convention on Climate Change
UNITAR	United Nations Institute for Training and Research
VRA	Vulnerability Reduction Analysis

## **SECTION I: Elaboration of the Narrative**

### **PART I: Situation Analysis**

#### *Context and global significance*

1. Given its geographical location and rugged topography, Ecuador is a highly vulnerable country to impacts of climate change (UNFCCC First National Communication, Quito, 2000). Periodic El Niño events, particularly those of 1982-83 and 1997-98, have demonstrated the catastrophic effects of climate variability in the country. This high degree of exposure, combined with the vulnerability of key economic sectors such as agriculture, health, energy, water resources, coastal resources, fisheries, infrastructure and tourism, reinforces the notion that Ecuador is a country particularly vulnerable to climate change.
2. Characterized by extreme diversity of climate zones, Ecuador boasts an extraordinary array of geographical systems that range from high altitude glaciers to tropical rain forests in the Amazon upper tributaries to dry tropical forest on the Pacific Coast, as well as an insular outpost in the Pacific with the Galapagos Islands, a World Heritage Site. Some of these systems show a greater sensitivity to climate change, or at least are considered most likely to undergo rapid changes as a result of climate change, including variability. As highlighted in the Millennium Ecosystem Assessment Summary Report, such ecosystems provide a range of environmental services that are critical to rural livelihoods and urban welfare. As these systems deteriorate due to various direct and indirect factors, including climate change, the quality of environmental goods and services also decreases.
3. The UNDP country programme (CPO/CPD) in Ecuador (2004-2008) supports the new government's efforts to reinforce citizen participation and democratic dialogue, combat corruption, reduce poverty and exclusion, and reactivate the economy to create jobs and wealth, as well as improve the environmental security. The natural endowment of Ecuador is summarized in an important natural resource base, an extremely diverse environment, rich and diversified culture and traditions, favourable climatic conditions and a potential access to world markets. This contrasts with the cycle of exclusion and inequality, forcing a majority of Ecuadorians into poverty. UNDP is assisting Ecuador combat poverty by strengthening social protection networks and technical and other resource support for expanding livelihood opportunities
4. Given high vulnerability to natural disasters, Ecuador needs to implement anticipatory measures in order to avoid recurrent costly climate induced hazards. Populations with limited resources are the most vulnerable to natural phenomena in terms of exposure to the risk of losing assets. The impact on infrastructure is another serious concern. By working with government institutions at the local and central levels, it is possible to contribute to the implementation of a range of risk reduction measures. UNDP will work closely with international financial institutions as well as with other United Nations Agencies and national authorities to support both the prevention and responses to natural disasters. The United Nations system contingency plan and the United Nations Emergency Team for Ecuador represent an invaluable asset to be utilized in this regard.
5. The country programme of UN agencies in Ecuador is articulated around three UNDAF objectives: (i) poverty reduction through improved access to basic social services and employment; (ii) democratic governance and transparency through strengthening of government institutions and decentralisation process; and (iii) sustainable environment through equitable access to natural resources.
6. The proposed project, which aims to address climate change risks confronting the water sector, will contribute directly to outcomes under two of these objectives:

UNDAF objective 1: poverty reduction through access to quality basic social services and productive activities

- Public awareness and policy dialogue on sustainable human development. *This project will contribute through promoting awareness on climate change risks on water resources and therefore on livelihood opportunities. It will contribute to the policy dialogue on sustainable human development by focusing on climate change issues relevant to human development.*
- Capacity of and partnership between local authorities and civil society organizations. *This project will contribute by focusing on developing partnerships between government, the private sector and civil society to manage climate change risks.*
- Access to basic social services and systems for risk management. *The project will contribute through establishing information systems that can support climate change risk management strategies.*
- Capacity development to manage and reduce risk of natural disasters. *This project will contribute by focusing on capacity development of key stakeholders to manage climate change risks.*

UNDAF objective 2: environmentally sustainable development to reduce poverty

- National policy, legal and regulatory framework for environmentally sustainable development. *The project's focus on policy instruments to manage climate change risks will promote environmentally sustainable development.*
- Institutional framework for sustainable environmental management and energy development. *The development of institutional structures to better manage climate change risks will be an important contribution to sustainable environmental management.*

7. This project aims to address climate change risks in the water sector. The project will mainstream climate change adaptation into water management practices in Ecuador through the integration of climate change risk of the water sector into key national and local development plans, the implementation of adaptation measures, and information management and knowledge sharing.

8. The project is designed to address a range of considerations that are a priority for improved management of climate risks. For one, the project will integrate climate change concerns into planning and policy formulation processes for water resources, including day-to-day practices of planners and other stakeholders (i.e. a “top-down” approach). The project will also train local and regional water resources managers in government agencies, grassroots organizations and NGOs on innovative approaches to mainstream climate change adaptation to water management practices (i.e. a “bottom-up” approach).

9. The project focuses on interventions at the national and local levels. At the national level, the project will improve water governance by incorporating climate risks consideration into water management and decision making processes. At the local level, interventions will be in specific provinces that have been identified based on climate change vulnerability assessments and stakeholder consultations. These provinces which host key watersheds have shown a political willingness to implement adaptation measures to climate change to improve the governance and management of water resources in the face of climate change with the participation of provincial authorities and local communities. The provinces where pilot measures will be implemented include Los Rios, Manabi, Loja and Azuay.

### ***Threats, root causes and barriers analysis***

10. Ecuador faces a variety of potential climate change risks associated with changes in temperature and precipitation, as well as possible alterations to ocean currents. Climate change impacts are difficult to predict and model for Ecuador due to its complex geographical and climatic situation associated with the existence of coastal, highland and forest regions, Ecuador's situation in the Inter-Tropical Convergence Zone (ITCZ), as well as the influence of the Humboldt Current and warm equatorial current, which converge off the coast. Nonetheless, it is possible to identify a range of plausible climate change scenarios for Ecuador and its regions, with relevance for planning in the water sector. These scenarios may be used to develop plans that will enable Ecuador to prepare for a range of possible outcomes of climate change, increase the resilience of the water sector, and avoid maladaptation.

#### *Temperature and Precipitation Projections*

11. Country-level data from the Tyndall Centre Country Scenarios (University of East Anglia, Norwich, UK), representing projections in average seasonal temperature and precipitation from a number of global climate models (GCMs), suggest increases in temperature of between 0.5° C and 6° C throughout the year by the latter half of the 21st century (2070-99), relative to the 1961-90 mean (Figure 1). Projected changes in precipitation range from about -15 to +15 percent, with the most coherent signal evident for the period June-August, when most simulations indicate a modest increase in rainfall of a few percent, although values range from about -2 to +12 percent. These simulations should be treated with caution due to the coarse resolution of the GCMs used to generate them, and because of the country-level aggregation inherent in the values, which neglects spatial variations in impacts. For example, a very small change in rainfall data aggregated at the national level may mask extreme variations of opposite signs in different regions. Nonetheless, the projections provide a range of values around which planning can take place.

#### *Coastal Region and El Niño*

12. The climate of Ecuador's southern coastal region is dominated by the cold Humboldt Current, which flows north along the coasts of Chile, Peru and southern Ecuador, generating the arid conditions and coastal fog characteristic of the Atacama and Sechura deserts<sup>i</sup>. The northern coastal region of Ecuador is affected by the warm equatorial current, which delivers moist air and rainfall as it flows south along the northern coast before meeting the Humboldt Current near the Equator. The southward extension of this warm current from December to April is associated with a single wet season. In El Niño years, up-welling associated with the Humboldt current weakens and the normally cool offshore waters associated with arid conditions on land are replaced by warmer waters and rainfall in the normally dry coastal region of southern Ecuador, which often leads to severe flooding. A study of the 1991/2 El Niño found that the centres of precipitation were restricted to the coastal plain below altitudes of 1000 m. Local rainfall maxima were observed over the Amazon region near the Peru-Bolivia border; however, rainfall over the Amazon region of Ecuador was reduced, a pattern also observed during other El Niño years<sup>ii</sup>.

13. A tendency towards more El Niño and fewer La Niña events became evident in the final three decades of the twentieth century, and there are suggestions that this change in the frequency and duration of El Niño conditions may be consequence of anthropogenic climate change that will persist or intensify in the coming decades. However, there is still considerable scientific uncertainty regarding the likely future evolution of El Niño. It might be noted that the periodicity of El Niño has varied over the past few millennia. Results from paleoclimatic studies of the last period when global temperatures were comparable with those predicted for the latter half of the 21st century (some 3 million years ago) are contradictory, although studies over a wide geographical area suggest that El Niño like conditions dominated in the Pacific during this period<sup>iii</sup>.

14. In the absence of a clear scientific consensus on this matter, and given these results, it would seem sensible to adopt a flexible planning approach that accommodates the possibility of more frequent and protracted El Niño events, with higher rainfall in the coastal regions, but which does not preclude

alternative scenarios. It must also be recognised that El Niño is a complex phenomenon, and different El Niño events in the past have not resulted in identical impacts on rainfall and water availability<sup>iv</sup>. The water sector will therefore benefit from improved scientific capacity to monitor and forecast El Niño events.

### *Andean Region*

15. Glaciers and ice caps in the Andean region of Ecuador are already being affected by atmospheric warming associated with climate change, and this will continue and accelerate as global temperatures increase by some 2° C by around 2050 and at least 3° C by the end of the 21st century. Between 1939 and 1998 air temperature increased by 0.11° C per decade in the Andean highlands, compared with a global 0.06° C per decade. Ice masses are already declining rapidly and glacier retreat is underway in all Andean countries. Climate models predict that maximum temperatures will increase in the Ecuadorian highlands, and increases in temperature in highland regions across the globe are expected to be greater than average. These trends may lead to an initial increase in water availability due to increased melting, but water stress will increase dramatically as glaciers and ice sheets shrink and disappear. Many Andean glaciers are likely to disappear completely within the next few decades<sup>v</sup>, with severe consequences for high altitude cities which depend on them for their water supplies. Quito currently receives part of its drinking water supply from the Antisana glacier, which is reported to have shrunk 7-8 times faster during the 1990s than during previous decades<sup>vi</sup>. A study in Columbia using high-resolution regional climate simulations indicates that projected temperature increases and changes in rainfall patterns have the potential to disrupt water and power supplies for significant numbers of the population even at low altitudes<sup>vii</sup>.

16. Dry conditions associated with negative mass balance in glaciers and ice sheets on the eastern Andean slopes of Ecuador occurred during the 1982/3 and 1991/2 El Niño events<sup>viii</sup>. Other research suggests that glacier retreat in the Andean region is broadly associated with warm El Niño conditions and increased sea-surface temperatures in the eastern tropical Pacific, with glaciers responding rapidly to changes in ocean temperature on timescales of months to years<sup>ix</sup>. Below average rainfall occurs during El Niño years in the north-western part of the Andes during December-February and in the eastern Cordillera during June-August.<sup>x</sup> Climate change may therefore further exacerbate water stress in certain highland areas through changes in El Niño, although, as noted above, there is at present no consensus on the likely future evolution of El Niño.

### *Amazon Region*

17. A number of studies suggest that climate change may result in a widespread drying of the Amazon region resulting in a loss of forest cover<sup>xi</sup>. While the most vulnerable regions are thought to be those in the northeast of the Amazon basin, in the longer term (i.e. by 2100) the impacts of climate change on the entire Amazon region could be severe. Warmer sea-surface temperatures during past El Niño events have been associated with anomalously dry conditions over northern Amazonia, as the ITCZ shifts north and subsidence occurs over the Amazon region of Ecuador<sup>xii</sup>. Coupled with reduced water availability from ice melting on the eastern slopes of the Ecuadorian Andes, a significant reduction in water availability in Amazonian Ecuador is a real possibility, particularly in the event the El Niño conditions become more common. In the lowland Amazonian region of eastern Ecuador, strong El Niño events are associated with more marked dry seasons, during which river levels drop.

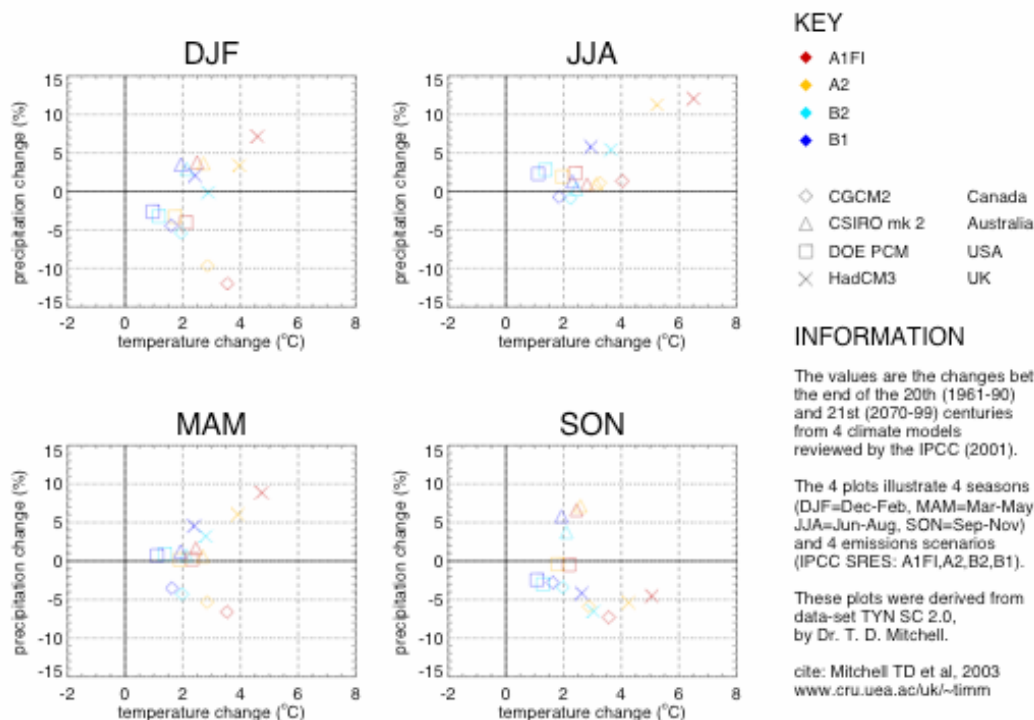
18. Climate change will lead to increased stress on the water sector in those parts of Ecuador which depend on melt water from glaciers and ice sheets, as these shrink and disappear over the coming decades as a result of increased atmospheric temperatures. Changes in highland melt water and runoff may also affect lowland river systems. The water sector should prepare for reduced water availability in the Andean region immediately.



19. A key challenge for the water sector is to decouple variability in water supply, and risks in the water sector, from climatic variability, which is strongly associated with El Niño and La Niña. At present it would be premature to plan for either an increase or a decrease in El Niño events, given the uncertainty regarding past and future impacts on El Niño of warmer average global surface temperatures and related changes in atmospheric and oceanic circulation. While high uncertainty remains in this area, capture and storage of water in extreme rainfall years associated with El Niño could play a major role in decoupling variability in water supply from climatic variability.

20. Planners in the water sector should have a broad scientific understanding of El Niño, and keep up-to-date with scientific developments in this field, including research into past El Niño variability, which may give an indication of the likelihood that El Niño activity will increase with anthropogenic climate warming. As more research results become available over the coming years it might be possible to identify emerging or likely trends in El Niño, which can form the basis for planning decisions.

21. It should be acknowledged at this stage that, despite the uncertainties described above, an increase in El Niño events is a real possibility. The water sector in Ecuador should therefore develop advance plans to cope with such changes should they materialise. In addition to an increase in water stress in the Andean region, these plans should focus on reduced water availability in the Amazonian region, coupled with an increase in water availability (largely in the form of extreme rainfall events) in the coastal region. Such plans should not be implemented immediately, but should take the form of contingency plans pending improved understanding of the likely future evolution of El Niño. Improved monitoring and forecasting of El Niño events will greatly improve preparedness for year-to-year climatic variations within the water sector, and may help to identify emerging trends that can be used for planning purposes. General measures to increase resilience in the water sector in the face of increased year-to-year climatic variability should be developed and implemented immediately.



**Figure 1.** Projections of changes in seasonal mean precipitation against temperature for Ecuador averaged at the national scale, from a variety of GCM simulations.

Under Ecuadorian legislation, water is considered a public resource and its use is authorized by the State through the concession of rights. Dispersion and overlapping of roles have evolved during the last two decades because of lack of a national policy to promote an integrated management of the resource. National laws regulating several aspects of water management but with sectoral biases have been introduced in approximately 27 legal instruments<sup>1</sup>.

22. There is currently no updated assessment of the state of water resources in Ecuador. The last available study dates back to 1989, and was commissioned by the former Instituto Ecuatoriano de Recursos Hidráulicos (INERHI) and the Centro de Estudios y Experimentación de Obras Públicas de España (CEDEX). This assessment served as a basis for the formulation of the National Plan for Water Resources (PNRHE), which inventoried surface waters and compared supply and demand for consumptive and non-consumptive uses of water. Fewer studies still exist regarding the state of groundwater supplies in Ecuador.

23. In year 1989, total surface water availability in Ecuador was 146,798 hm<sup>3</sup>/year. Ninety percent of this total was found in the Eastern Lowlands, which are part of the Upper Amazon Basin. This total runoff should theoretically supply 43,500 m<sup>3</sup>/capita/year for all water consumption - four times the world average (10,800 m<sup>3</sup>). In real terms, the assessment estimated that Ecuadorians had some 1,300 m<sup>3</sup>

<sup>1</sup> National Water Resources Forum, "Policies Proposal", Ecuador, 2003.

/capita/year at their disposal with values varying from one region to another, as the country has a sharp precipitation gradient between the Amazon Basin, the high Andes and the dryer Pacific Coast. End use of water in Ecuador was estimated at 9.700 hm<sup>3</sup>, of which irrigation constituted 82.1% of consumption needs, followed by domestic use with 12.3% and industrial use with 5.6%. Still, these figures have not been updated, and projections of supply have not factored-in the impact of climate variability and climate change on water supplies in Ecuador.

24. According to Ecuador's First National Communication to the UNFCCC, among the current climate risks that are set to increase over time with climate change, the disruption of adequate water supplies are considered the most critical, particularly in highland Ecuador. Due to the cross-cutting nature of water resources, increased mean temperatures, recurrent drought, retreating glaciers and more intense and concentrated rainfall will have a wide ranging set of impacts on agriculture, energy and water supply. These heightened vulnerabilities to climate hazards will also compound current water governance problems in Ecuador.

25. Certain provinces on the coast and in the Andean region, such as Loja, Manabí and El Oro, have already suffered intense droughts that have put these regions on the verge of desertification. In some cases, aquifers have descended from 15 to 20 meters to 80 to 100 meters. Many wells already do not provide water and small communities lack the resources to perforate deeper wells.

26. In the province of Loja, to the South of the country, water flows seasonally through the main rivers and remote communities depend on small creeks and shallow wells that have almost dried up since the drought began. In the province of Manabí water must be transported in trucks at a very high cost.

#### *Economic impacts of extreme events*

27. During 1982-83, floods in Ecuador left 600 dead and \$650 million in economic losses. The information available for the period, 1997-1998 indicates that the El Niño phenomenon caused a total of \$112.3 million in damages, which is 4.7% of the agricultural GDP and 0.6% of the total GDP. In the energy sector, the greatest damages affected the Paute hydroelectric power station, whose repair costs amounted to \$17 million.<sup>2</sup>

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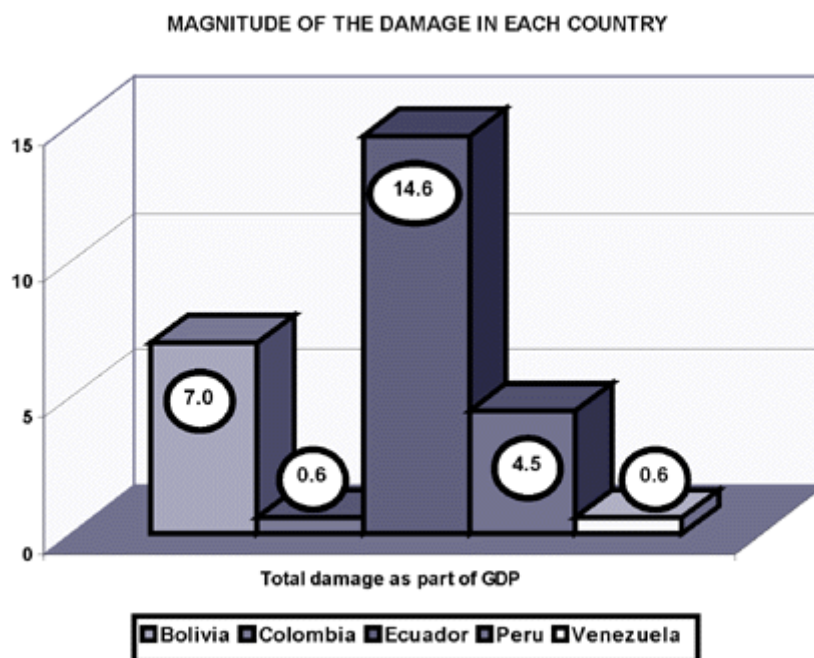
<sup>2</sup> CEPAL, 1998

### Estimation of the Overall Direct Cost of the Damages Caused by El Niño, 1997-8

Sub-sector	1997-8 (until June 1998) (Millions of US dollars)		
	Costs	Benefits	Net Costs
Agriculture	182.3	15.3	167.0
Farmers-owners	50.8	6.7	44.1
Agricultural workers	<b>73.9</b>		<b>73.9</b>
Domestic traders	57.6	8.6	649.0
Livestock	7.7		7.7
Livestock farmers-owners	2.4		2.4
Wage-earners in livestock	2.7		2.7
Shrimp farming	7.5	75.5	-68.1
Fishing	12.4	6.7	5.7
Traditional fishing	12.4		12.4
Industrial fishing boats	6.7		6.7
<b>Total Agriculture, Livestock and Fishing</b>	<b>209.9</b>	<b>97.5</b>	<b>112.3</b>
(% of agricultural GDP)	8.8%	4.1%	4.7%
(% of total GDP)	1.1%	0.5%	0.6%

Sources: Vos, Velasco and De Labastida (1998).

28. A study carried out by the Andean Development Corporation estimated that the total economic impact of the damage caused by the El Niño phenomenon in the Andean region between 1997 and 1998 was US\$7.5 billion. Ecuador's bill came to 14.6% of its Gross Domestic. The figure below provides a breakdown of the cost of this climatic event as part of the GDP by country.<sup>3</sup>



<sup>3</sup> ISDR, 2001

29. As a result of El Niño, the Ecuadorian coast is frequently impacted and bears significant costs. For example, the coastal area that was mainly affected by flooding during the most recent El Niño event was the Central Coastal Zone of Manabí, which includes the river basins of Chone, Portoviejo, Jipijapa and Zapotal. Measures have been proposed to strengthen the organization of farmers to take better measures such as the establishment of seed banks and learn to make better use of the available meteorological data to prepare for the floods.

30. Among other recommended measures are improved flood zoning, reforestation of watersheds, a reduction in pasturing, and the construction of check dams. In parallel, measures to improve the capacity of local populations include training in interpretation of meteorological data, control of disease vectors, and organization of safe water supplies, including the rehabilitation of water-treatment plants.

### *Institutional, sectoral and policy context*

31. At present, a policy framework for water management has not been formulated in Ecuador. Only general declarations have been issued as part of government state reform plans, but these are not detailed enough to implement strategies to be considered effective policies. Of all the key sub-sectors such as irrigation, hydroelectric generation and water for human consumption, only the latter sector has a strategic plan which was formulated in 2003. Moreover, several hydroelectric projects have been approved over the last years without due consideration to an explicit development strategy for water in the context of other current and emerging threats such as climate change.

32. A National Water Resources plan was written in the eighties by the National Institute of Water Resources (INERHI) and the National Development Council (CONADE) which was then the planning agency of the Ecuadorian government. This plan included the first and only inventory of water resources that has been elaborated in Ecuador. Subsequent institutional reform suspended its execution. Another plan, elaborated in 1990 with cooperation from the World Bank, was not even published. In 2003, the National Council of Water Resources (CNRH) issued a document called “Water Resource Management in Ecuador: Policies and Strategies”, which reviews the situation of water management, pinpoints problems and defines strategies, including an institutional reform that would, among other things, place CNRH under the leadership of the Ministry of the Environment (MoE). This strategy has not been implemented, as control over water use concessions is a very sensitive issue<sup>4</sup>.

33. A sectoral plan has been formulated for energy generation and a strategic water and sanitation plan has also been developed. Other sectors have not gone through such planning processes. As a result of this lack of coherent planning, water is managed through ad hoc projects implemented without an integrated vision.

### *Institutions*

34. In 1994, Decree 2224, which modified the institutional and legal framework with regards to water management in Ecuador, was issued. INERHI was replaced by the National Council of Hydrologic Resources (CNRH) and five additional CDRs (added to the four CDRs already in existence). CDRs are responsible for constructing and managing public irrigation systems and general constructions associated with water; as well as, flood & water quality control, inventories and assessments of the water resources on their area of competence.

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<sup>4</sup> Implementation arrangements for this project will ensure that all relevant ministers, the provincial governments of selected provinces, and the relevant organizations at the local level, participate in a coordinate fashion to ensure the necessary support throughout the life of the project. MoE will establish a pro-active follow up to keep the stakeholders engaged and to provide a platform for conflict resolution.

35. The CNRH is mandated to define policies and strategies for the water sector, as well as manage the concession of water rights for all uses. Its regional water agencies are the prime agents of water governance, and key actors in the attribution of water rights and the resolution of conflicts between end users. However, the management capacities of CNRH are limited in order to maintain an accurate, updated register of concession rights (which are granted after a lengthy, bureaucratic process that does not use updated information on the real availability of water). Additionally, CNRH has assumed responsibilities in irrigation policies and infrastructure.

36. The institutional framework for the management of water resources has evolved during the years according to the needs of key sub-sectors (irrigation, hydro-energy, water for human consumption). Thus planning, regulatory, controlling and execution roles assigned to institutions from the national to the local level have witnessed a number of changes. A more detailed description of these institutional changes is provided in Annex 1. A critical issue is the fact that the main institution in charge of regulating the uses of water and issuing concessions for water rights and use, the CNRH, is hosted and presided by the Ministry of Agriculture. This is perceived as one of the reasons for a bias in water allocation rights towards the agriculture sector, favouring the use of water for irrigation systems.

37. The institutional developments that have taken place have not accomplished the desired results, that is, to improve coverage, quality, and efficiency in water-related services including the elimination of pricing policies that do not promote the sustainable use of scarce water resources. Operation and maintenance costs are not covered by the existing tariff structure and, partly as a result, drinking water systems, particularly in rural areas, have been neglected.

38. Water for irrigation is a particularly politically sensitive sector. The National Water Resources Institute (INERHI) has been responsible for the management of irrigation water for over 30 years. INERHI had a mandate to build irrigation systems but neglected the formulation of policies and development plans. At the same time, irrigation systems and infrastructure were also built by the Regional Development Corporations (CDRs), created to manage natural resources and infrastructure in several regions of the country. The latter weakened the effectiveness of INERHI.

#### *The regulatory framework for water management*

39. The Water Resources Forum (FRH), which groups users' organizations, states that 27 legal instruments regulate different aspects of the management of water. These include the last Constitution (issued in 1998), the Water Law (1972), the Environmental Management Law, the Preservation and Contamination Control Law, the Civil Code, and other regulations including those issued by municipalities.

40. The Water Law (1972) establishes two basic principles: a) water is a public resource, its use being authorized by the State (through CNRH's Local Water Agencies); and b) the concession of use rights follows a pre-determined order of importance: (1) human consumption (cities and people) and cattle raising (2) irrigation (agriculture), (3) hydropower, industrial and mining and (4) other uses (spring waters, spa). As a result, water concessions are assigned through a pre-defined order of priority and by a simple administrative decision of the Water Agency. Social and/or economic efficiency and actual availability of the resource are not taken into account. This arrangement promotes the issuing of excessive concessions and the concentration of water in the hands of a few powerful users (bigger farmers, industries). Environmental considerations do not influence the decision. Conflicts between users are solved through legal processes.

41. The Water Law clearly states that INERHI (now CNRH) should dictate policies and take care both of the conservation of watersheds and of the quality of water. However, to complicate matters, other laws give similar roles to a series of other institutions: the Ministries of Health and the Environment, Provincial Councils, and Municipalities. This leads to conflict and delays actions when needed.

42. Regarding tariffs for the concession of water rights, the Water Law excludes from any payment to water for human consumption and for electricity generation provided to public service. In practice, users of water for irrigation pay the most for their water: 0.0015 USD per litre/sec. In contrast, bottlers of water pay only 0.0008 USD per litre/sec.

43. The Water Law also states that the cost of infrastructure to provide services, such as domestic water supply should be recovered through tariffs. This responsibility has been delegated to Regional Development Corporations, Provincial Councils, Municipalities, hydroelectricity generation companies, among others. In practice, investments and operating and maintenance costs are not recovered. Services are subsidized by the Government, Provincial Councils and Municipalities. The infrastructure built is expensive, water consumption is high and subsidies benefit wealthier households. In contrast, the poor do not have access to drinking water, or irrigation facilities and are forced to purchase water from a combination of sources— which leads to disproportionate burden on household incomes relative to wealthier households.

#### *Water and climate-related measurements and infrastructure*

44. This situation is compounded by the lack of accurate data on water production and usage. INAMHI, the National Institute of Meteorology and Hydrology is in charge of gathering and analyzing hydrologic and meteorological information. Before their dissolution in the nineties, INECEL and INERHI had a well-developed information-gathering network that complemented INAMHI's network. However, INAMHI faces serious difficulties in maintaining its network, mainly due to the lack of appropriate funding. As a result, key maintenance activities have been ignored and some hydro-meteorological stations have been lost or are not in operation. Other institutions like the Aeronautical Direction, Regional Development Corporations, the Navy's Oceanographic Institute (INOCAR), and the International Centre for Research on the El Niño Phenomenon (CIIFEN), which are based in Guayaquil, have some information-gathering capacity. In spite of this capacity, networks have been generally neglected. Several water resource projects have been planned and implemented based on inaccurate estimations of available water resources.

45. According to the INAMHI, there are 125 water stations across the country. However, most stations have old equipment; some are located in sparsely populated areas, and additional stations are needed to complete the network. Most existing stations measure only water level, although some also measure flow. The country also has more than 193 meteorological stations of several kinds that measure rainfall, and others record additional meteorological variables. These stations are supported by different agencies, but INAMHI centralizes the data. Information about water availability and the impacts of climate change and variability on water resources that is produced by a host of institutions, especially the INAMHI, is not useable or readily available to improve water management.

46. Irrigation represents 82.1% of the water consumed in Ecuador. However, irrigation infrastructure is extremely inefficient, resulting in large volumes of wastage. According to GWP, several studies have determined that the efficiency of public irrigation infrastructure is 30%; while the efficiency of private irrigation varies between 16% and 50%. Only private users growing crops for export have water-saving irrigation technologies. Most private irrigation channels are not waterproofed; public irrigation channels are, but water is frequently wasted in distribution to small plots that do not have appropriate water-saving technologies.

### *Water and the agriculture sector*

Ecuador has traditionally been an agricultural country. In 1998, according to projections by the SICA World Bank Project, 31% of the country's territory was used for agriculture and livestock. The sector contributes about 17% of the country's GDP, and 31% of the labour force is involved in agricultural activities.

National farming and livestock production growth has relied on expanding the agricultural frontier rather than on improving productivity. Land use for farm and livestock has increased 5.7% per year since 1990. The country's staple diet includes rice, potatoes, and corn. Soybean is used to manufacture oil and vegetable shortening. These crops are concentrated in certain regions of the country, for example rice in the provinces of Guayas and Los Ríos (94%), corn in the provinces of Manabí, Los Ríos, and Guayas (70%), potatoes in the central and Northern provinces of the country's sierra (87%), and soybean in the province of Los Ríos (97%).

According to Ecuador's Initial National Communication, agriculture is the most vulnerable sector to climate change. Along the central and southern parts of the coast, in the basin of the Guayas River, floods annually cause severe damage to agricultural, commercial and residential sectors. Climate change is likely to result in more severe flood events. This basin is home to 40% of the country's population and a major agricultural centre. Flood control in this area would increase enormously the agricultural production of rice, corn and bananas. Some preliminary studies suggest that flood control infrastructure in the high part of the basin would help to reduce floods, but local protection in the lower part of the basin between the rivers Babahoyo and Cañar is also needed.

The assessment considered food security for years 2010 and 2030 on the basis of two climate change scenarios (CCS2 = temperature: +1.0° C, rainfall: +20% and CCS3 = temperature: +2.0° C, rainfall: -15%) Under CCS2, the supply of rice, corn, soybean, and potato would surpass the projected population's needs in year 2010. If CCS3 were assumed, the supply of soybean and corn would still be somewhat higher than projected demand while the opposite will occur with rice and potato. These two crops would show a deficit of 49% and 17% respectively. For year 2030 and under scenarios CCS2 and CCS3, supplies of rice and soybean would not meet demand, whereas for potatoes and corn, the situation would be the opposite.

At the same time, non-climatic factors also contribute to the vulnerability of the agriculture sector. In recent decades, deforestation has exacerbated the likely impacts of climate change in the hydrological regimes of the basins, increasing the risk of floods. Industrial, residential and agricultural development has attracted settlers to the high-risk areas in the alluvial low plains. Efforts to address deforestation and promote reforestation are on going, and outside the scope of this project, but important work is still needed to implement flood early warning systems.

Adaptation measures that have proven to be most valuable are agro-ecological zoning and modifying the timing of sowing and harvesting, the introduction of different varieties, the installation of irrigation systems, the appropriate use of fertilizers, and the implementation of a system for controlling pests and disease.

47. Water also plays a key role in energy production. Ecuador has a total installed energy generation capacity of 3,819 MW of which 45.2% comes from hydropower and 46.6% from thermal generation. However, in terms of energy actually generated, the annual averages are 52.1% from hydropower generation, 36.4% from thermal generation (mainly through the burning of imported and subsidized diesel) and 11.5% is imported from Colombia<sup>5</sup>. The theoretical potential for hydropower generation was measured in year 1997 and estimated to be at approximately 73,390 MW<sup>6</sup>.

48. Due to the lack of rains during September to December, Ecuador frequently implements emergency measures to avoid possible blackouts. The effects of low rainfall are most evident in the area where the main hydroelectric plant, Paute is located. During these months, the rivers that feed the Paute dam are at

<sup>5</sup> CONELEC: "Estadística del Sector Eléctrico Ecuatoriano", 2005

<sup>6</sup> Neira, Van Den Berg, De la Torre, F.: "El Mecanismo de Desarrollo Limpio en Ecuador", Quito, 2006



its lowest levels. As Paute provides 35% of the energy needs of Ecuador, it is crucial that the plant operates at its full capacity on a regular basis. The energy rationing during the low rain months has negatively impacted the economy while causing annoyances to the general public. Successive governments have proposed solutions to remedy the situation, but to date there have been no effective measures taken.

### ***Water and the energy sector***

Most hydropower projects are located mostly in the Amazon basin; the most important ones currently operating are:

- Paute (Amazon basin, province of Azuay): 1075 MW
- Marcel Laniado (Pacific basin, province of Guayas): 213 MW
- Agoyán (Amazon basin, province of Tungurahua): 156 MW
- Pucará (Amazon basin, province of Tungurahua): 68 MW
- Saucay (Amazon basin, provinces of Cañar and Azuay): 24 MW

The costs of disruptions have significant impacts in the national economy. Power generation is vulnerable to climate change, including variability. Seasonal droughts affect the Amazon basin and cause yearly “electric emergencies”. The Paute hydropower project is particularly affected by yearly seasonal droughts, which leads to energy rationing and blackouts with enormous losses for key economic sectors<sup>7</sup>. New hydropower projects are under development but none take into account climate change scenarios in their projections of power generation. The most important planned projects are Coca-Codo Sinclair, which would produce more than 800 MW, San Francisco (212 MW), Mazar (190 MW, to improve the capacity of the Paute project) and Sopladora (312 MW, to improve the capacity of the Paute project), all in the Amazon basin. Only Baba (45 MW) and Toachi-Pilatón (190 MW), will be developed in the Pacific basin.

When considering the two climate scenarios that predict a decline in rainfall, the Agoyán Project (Pastaza river basin) would suffer a 23% drop in inflows, basically during the low-water period, while the Paute Project (Paute river basin) would only be able to provide between 43% and 45% of average power capacity, meaning a deficit of about 27% compared to energy production under current conditions. For the case of the scenarios that predict a rise in rainfall, there would be an improvement in the supply of water resources for hydropower generation; thus, the Agoyán Project would meet 100% of its needs and the Paute Project would improve by about 79%, on the basis of which energy production could increase by about 48%, without making any additional investments, since the station has installed capacity. One shortcoming of this study was that although it examined river flows for the river basins, detailed impacts in each lower river basin needs further analysis.

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<sup>7</sup> An Internet search identified more than 200 references to the yearly electric crisis caused by seasonal drought in the Paute region, see Annex 3.

### *The institutional framework for addressing climate change concerns in Ecuador*

49. Climate-related institutional and governance issues have undergone major changes during the last decade. The Climate Change Unit of Ecuador's Ministry of Environment, created in 2000, and has been very active since its inception. Despite limited staff and other resources, it has been successful in taking advantage of funding opportunities in the last decade. MoE has obtained funding for 8 projects which formed the basis for the "climate change process" initiated in 1993. The Climate Change Unit currently hosts the coordination and preparation of the Second National Communication (SNC) to the UNFCCC.

50. The Minister of the Environment is also the head of the National Climate Committee (CNC), which has the mandate for directing and leading the policy process and development of strategies regarding climate change mitigation and adaptation. The CNC is a collegiate body composed of representatives from several ministries (environment, energy and mines, foreign affairs, planning), as well as from the business sector, the NGO sector and the academic sector. While the MoE presides over the CNC, the INAMHI has a secretarial role.

51. Under the auspices of the MoE and the CNC, the country produced its First National Communication to the UNFCCC and is implementing the SNC. In 2006, a National Climate Change Strategy was produced, which evaluated the degree of institutionalization of climate change considerations in the national institutions. The evaluation concluded that further efforts were needed in order to strengthen the national capacity to cope with climate change. The National Capacity Self Assessment (NCSA) report also states that considerable opportunities for integrating climate change adaptation into the policy arena are being lost due to lack of inter-institutional coordination and insufficient national and local capacities in this area.

52. The SNC proposes to develop a National Adaptation Strategy to Climate Change, and to adopt a very aggressive communications strategy to educate both policy makers and the general public. This project would apply and expand the guidelines provided by the National Adaptation Strategy to the water resources sector, thus informing the SNC while at the same time making use of the multi-sectoral view, political momentum and support created by the SNC.

53. Except for INAMHI and MoE, no other public or private institutions have specialized units for climate change-related issues. The production of data for the National Communications is usually carried out by ad-hoc teams or by staff from other agencies.

54. Despite the publication of the First National Communication to the UNFCCC, a considerable body of information on climate change remains dispersed. There is a clearly identified need for knowledge brokering between core stakeholders in the climate change community and an outreach strategy to mainstream adaptation policies across various sectors, which would benefit from timely, accurate and accessible information on climate trends and risks in Ecuador. While there are centres of scientific excellence located in Ecuador, and institutions such as INAMHI, INOCAR and recently CIIFEN, have contributed to monitoring climate variability and long term changes in climate patterns in Ecuador, much of the scientific information is not readily available or in a useful form for national and local decision making processes.

## *Stakeholder analysis*

55. The project will rely on a wide range of key partners to mainstream climate change and adaptation concerns into the water sector in Ecuador. In this sense, participation will be the key to success of the project. Key stakeholders to be involved in the project, and who have been consulted during the preparatory phase of this project, are described below:

- Comité Nacional del Clima (CNC)- the National Committee for Climate- is a collegiate body composed of representatives from several ministries (environment, energy and mines, foreign affairs, planning), as well as from the private sector, the NGO environmental sector and the academic sector.
- Ministry of the Environment (MoE) is the GEF operational focal point. The technical focal for the UNFCCC is also located in the Under Secretary for Environmental Quality. The MoE presides over the National Climate Committee (CNC). The MoE will chair the National Steering Committee of this project (see section on implementation arrangements).
- The Planning and Development National Secretary (SENPLADES), which is in charge of planning and management of strategies for the development of the country. SENPLADES has formulated general and sectoral risk management plans (health, transport, drinking water and sewage systems).
- The National Council of Hydrologic Resources (CNRH) was created in 1994, to replace the INERHI, with responsibility for monitoring the state of water resources and managing the concession of water rights. Created in conjunction with Regional Development Corporations (CRD), such as CEDEGE, the regional water agencies of the CNRH are the prime agents of water governance, and a key actor in the attribution of water rights and the resolution of conflicts between end users.
- The INAMHI is the National Institute for Meteorology and Hydrology of Ecuador. It has a key role in climate affairs in Ecuador, with a network of monitoring stations and overall supervision of official forecasting. INAMHI will have a lead role in climate data and observation, early warning system, along with the Navy's Oceanographic Institute (INOCAR) and the International Centre for Research of El Niño phenomenon (CIIFEN). Coordination with the World Meteorological Organization, through its Global Climate Observation Systems Programme (GCOS) and United Nations Environment Programme (UNEP) will be established given the expertise and relevant initiatives of these organisations in climate data around the world.
- The Water Resources Forum (FRH), a water users association, represents the views of the small consumers, peasants and NGOs. This Forum has become an important public arena for discussions on water policies.
- The provincial and municipal authorities, regional development corporations and watershed-management authorities, all in charge of water-related infrastructure investments and/or of the care of key watersheds in the selected provinces (Manabí, Los Ríos, Azuay and Loja).
- Other entities in charge of meteorological monitoring of water flow in watersheds, sea level, marine currents and related issues and ENSO events such as, CDRs, INOCAR, CIIFEN, amongst others.

- Other institutions that group provincial/local governments such as the Consortium for Provincial Governments of Ecuador (CONCOPE). This Consortium comprises of all the provincial councils of Ecuador and the Association of Municipalities of Ecuador (AME). It also consolidates funds created to manage environmental and water management projects (i.e. FONAG, FAN). CONCOPE, supported by the Sweden Technical Cooperation, is currently executing a project that seeks to strengthen the watershed management in Provinces.
- The technical teams and institutional structure in place for the Second National Communication (SCN). The SNC team reports to the UNFCCC on national efforts to address climate change, to formulate a national strategy, and to identify priorities for mitigation and adaptation, including potential projects for funding in these areas.
- The technical teams and institutional structure for the GEF-World Bank Andean Region Adaptation Project, whose objective is to implement adaptation measures to meet the anticipated impacts from the catastrophic glacier retreat induced by climate change.

56. The list of key stakeholders for project implementation is presented in Annex 2. The following organizations played a pivotal role in the design of the project proposal:

- Ministry of Environment: Lead the process of project formulation by providing a coordination role in the formulation of the project and the consultation process and bilateral discussions with experts and key institutions. MoE was responsible for the analysis of the information provided and the preparation of the project proposal for submission to the GEF Secretariat through UNDP.
- National Council of Water Resources: It provided key information on the water baseline and water polices, and participated directly in the project formulation.
- National Secretary of Planning and Development: Assisted in the definition of priorities for the project by providing key inputs to the project design. It also contributed with key information such as risk maps, policies for the national development plans, among others.
- National Institute of Meteorology and Hydrology: Provided information for the baseline and assisted in the identification of key issues to be improved at the provincial level (e.g. strengthening of climate information)
- The Water Resources Forum: It contributed to the discussions from the perspective of small water users. Its participation confirmed the need to include the local communities in the design and implementation of adaptation measures on the ground. It reinforced the strategy to ensure adequate linkage between the policies to address climate risks in the water sector and the needs of the vulnerable community.
- The Consortium for Provincial Governments of Ecuador: Assisted in the selection of the Provinces to be included in the project, through an analysis of vulnerable areas, including the identification of identify key actors in the vulnerable areas.
- United Nations Development Programme: As the Implementing Agency for the project, UNDP facilitated the preparation of the
- Other institutions: Other institutions included SG Paute, Hidro Paute, FONAG, Intercooperacion, among others.

### *Baseline analysis*

57. At present, the water sector in Ecuador is characterized by unclear institutional coordination mechanisms for relevant policy makers, the absence of strategies for effective water resource management that take into account climate change risks, and limited stakeholder participation. In spite of on-going initiatives of relevance for the development of the water sector, there is a lack of solid

understanding of how climate change would impact water supply and demand. Thus many plans and programmes that affect water resources are being designed or implemented without considering the need to address climate change risks on water resources. Under the business-as-usual scenario, on-going initiatives will continue to ignore the threats of climate change including variability on water resources. In turn, the long term viability and sustainability of such plans and programmes will be compromised.

58. At the local level, water management practices do not take into account risks associated with climate change and variability. In light of expected climate change impacts on water, population are unlikely to cope with anticipated risks. Adaptation will continue to be reactive and occur on an ad hoc basis. It is likely that responses will typically be after extreme events generate significant impacts on key economic activities (such as agriculture and energy production). Furthermore, adaptation interventions in Ecuador will be limited to assessments and general description of adaptation measures, rather than lessons from implementing specific response measures that can be replicated in different scales. As a result, stakeholders and national institutions will not be able to learn from experiences and update national and local planning to address climate risks on water resource management.

59. National capacity to address adaptation to climate change in the water sector is currently weak. Ongoing efforts to strengthen it are described in the Second National Communication. However, the SNC only covers descriptions of necessary adaptation responses. The SNC process does not address the capacity needed for implementation of adaptation measures on the ground, nor the strengthening of institutional capacity to mainstream climate change risks into the water sector.

60. At the local level, neither provincial authorities nor community-based organizations are currently able to design and implement locally appropriate solutions to increase resilience against the impacts of climate change in the water sector. This is primarily due to lack of appropriate training, and the absence of practical approaches from which local solutions could be adapted to facilitate the participation of local stakeholders to address climate change risks.

#### *GEF Alternative Scenario*

61. The project alternative scenario is a water resource sector in Ecuador where climate risks are mainstreamed into relevant plans and programs at the national level and in four select provinces. Local stakeholders will be informed about current climate vulnerability and climate change risks, and these concerns will be incorporated into local policies and decision-making processes. With this in mind, the project will provide a practical framework to guide the process of integrating climate change risks and adaptation into relevant water management plans. The guidance will serve as a comprehensive and practical reference on how local water governance institutions can integrate climate change risks into ongoing water management strategies and plans more effectively.

62. The project will result in modified national water policies that increase the flexibility and resilience of productive sectors to climate change, specifically those that rely heavily on water resource availability and usage. At the national level, monitoring capacities for environmental changes linked to climate change impacts on water resources will be strengthened. This in turn will provide the means to assess vulnerability and to design appropriate responses. Decision makers involved in water management at all levels and the general public will be more aware of the impacts of climate change and options for increasing capacity to deal with expected impacts.

63. At the local level, provincial authorities and community-based organizations will have the capacity to integrate climate change concerns into local water development planning processes, and will be able to design locally appropriate solutions to address anticipated impacts of climate change. They will have recourse to lessons learnt from demonstrations of adaptation responses implemented through this project.

## **PART II: Strategy**

### *Project Rationale and Policy Conformity*

64. The project will build upon the momentum created by the SNC in Ecuador. Ecuador faces multiple hazards and presents a wide range of vulnerabilities to climate change. The impact of recurrent ENSO events demonstrates the widespread effects of climate variability in the country. In the past, Ecuador has suffered the impact of recurrent drought, periodic flooding and associated losses in productive sectors. The effects of climate change are expected to intensify these impacts over the coming years and decades.

65. As the distribution and availability of water resources is projected to change over time as climate changes, governance structures and water use practices will need to adapt. Much of the requisite adaptation will be local in nature and will occur spontaneously. However, deliberate and anticipatory adaptation to climate change requires an iterative and multi-tiered approach that enables the adoption of sound development choices that will increase climate resilience of the water sector. It will also require involving different sectors and levels of society.

66. Future public and private investment in productive uses of water, particularly in irrigation and hydro energy—two very large consumers of water resources, will need to factor in changes in the reliability of rainfall and the availability of surface water. Incremental investments will be needed to increase water storage, introduce water-saving technology and protect settlements and productive assets. Sturdy institutions and adequate water governance schemes are required to tackle the growing threats of climate change impacts in the availability and quality of water resources.

67. A single project cannot hope to address the entire spectrum of climate change risks on the water sector in Ecuador. For this reason, the scope of the project has been purposefully circumscribed. Based on consultations conducted during the project preparation phase, this project will address priority capacity development and institutional change necessary to address climate change risks on water resources. It will also implement specific responses at the local level in two important economic activities so that lessons and best practices can emerge.

68. Programming for adaptation through this project will promote climate-resilient development of the water sector. As the project will seek to integrate climate change risks into the water sector, it will directly contribute to the achievement of the Millennium Development Goals, particularly Goal 1 (poverty eradication) and Goal 7 (environmental sustainability).

69. The project will work with the relevant stakeholders in the mainstreaming of climate risks into national water policies. It will strengthen monitoring capacities for changes in water resources linked to climate change as a means to support the design of appropriate water management responses in light anticipated vulnerabilities. At the local level, pilot activities will seek to improve experiences in implementing anticipatory adaptation responses thereby increasing local awareness of climate related risks and improving adaptive capacity of vulnerable groups. Special attention will be given to the implementation of adaptation measures on the ground with the participation of local communities and provincial and municipal governments.

70. The project is consistent with the eligibility criteria for the SCCF, as laid out in “Programming to Implement the Guidance for the Special Climate Change Fund Adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change at its Ninth Session” (Council paper GEF/C.24/12; October 15, 2004). Consistent with the Council Paper (paragraph 40), the project is:

- country-driven, cost-effective and integrated into national sustainable development and poverty-reduction strategies; and
- takes into account national communications and other relevant studies and information

71. The project will also serve as a catalyst to leverage additional resources, and efforts have been made to maximize co-financing from other sources (GEF/C.24/12, paragraph 25). The selected sector is one of the priorities outlined in paragraph 44 of the GEF document, namely water resources management.

72. The project will support capacity building, including institutional capacity, for preventive measures, planning, preparedness and management of disasters relating to climate change, including contingency planning for droughts and floods in areas prone to extreme weather events (GEF/C.24/12, paragraph 46), and support strengthening existing centres and information networks for rapid response to extreme weather events, utilizing information technology as much as possible (GEF/C.24/12, paragraph 47). Furthermore, as described earlier, the costs of water resources use falls disproportionately on the poor, and the project therefore recognizes the link between adaptation and poverty reduction (GEF/C.24/12, paragraph 41).

### *Project Goal, Objective, Outcomes and Outputs/activities*

73. The project Objective is “to increase adaptive capacities to address climate change risks in water resource management”. This will contribute to the broader Goal of “mainstreaming climate change risks into water management practices in Ecuador”. The project Objective also corresponds to the third of the four global objectives identified under TA2 (Water Resources and Quality) in UNDP’s global “Monitoring and Evaluation Framework for Adaptation”, namely Adaptive Capacity: Institutional capacity of water sector including supply and demand management to respond to long-term climate and change. The project will contribute to the MDG Goal 7, Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources. A better management of climate change risks and water management practices at the local level will also contribute to achieving MDG Goal 1, Eradicating extreme poverty and hunger.

74. The formulation of the project strategy (outcomes and activities outlined below) is based on the guidance of UNDP-GEF’s Adaptation Policy Frameworks document<sup>8</sup>. A vulnerability-based approach was utilized by applying criteria by which climate change risks on water resources is assessed, taking into consideration the probability of exceeding a threshold level of risk.

75. The approach adopted seeks to answer questions that are relevant to identification and adoption of policies that address climate risks in the context of national development priorities. For instance, some of the key questions that the project will address include: To what extent are the expected benefits from existing development projects or initiatives sensitive to climate risks? How should current climate variability be taken into account to build climate resilience of the systems or sectors? How should future climate change be incorporated into the design of development initiatives or into national planning processes?

76. During the PDF process, the following steps were undertaken to design the project and involve the key stakeholder in the identification:

- a) *Establishment of a project team*

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<sup>8</sup> UNDP, 2005, Adaptation Policy Frameworks for Climate Change: Developing strategies, policies, and measures.

A PDF team was formed which reflected to inter-sectoral nature of the problem to be addressed.

*b) Scoping of project*

- Review and synthesis of existing information, using in particular information from the Initial National Communication and various sectoral strategies and plans.
- Establishment of a stakeholder process, which involved numerous small and larger interactions with different stakeholder groups.
- Prioritization of key systems, in which information from the FNC and other sources was used in identifying the water resources sector as being especially vulnerable, and the agriculture and hydro-power sectors as being priorities, based on the proportion of total water consumption accounted for.
- A review of the institutional structures and interrelations which are relevant to water management at the national and local level. This activity was essential in identifying gaps, weaknesses and opportunities to be considered when designing appropriate water governance schemes to address climate change in the water sector. The review was carried out in the context of the institutional structures needed to implement long-term interventions that will ensure the sustainability of the project.
- A review of the policy process, examining the relationship between key policy process and climate change adaptation; the potential for integrating adaptation concerns into policy agendas, and ways to improve existing linkages for policy coherence and to strengthen commitment to adaptation. Special attention was given to the potential linkages between the project and the achievement of the relevant MDG goals.
- Definition of the criteria for a monitoring and evaluation framework to assess the impacts of an adaptation strategy for the water sector in the context of broader development priorities.

*c) Design of the project*

- Selection of approaches and methods – as discussed above, the vulnerability-based approach was selected as the basis for project design
- Determination of project objectives and outcomes
- Development of indicators, on the basis of discussions among stakeholders
- Development of a monitoring and evaluation strategy, based on the project logframe matrix

77. The Project's Expected Outcomes, the details of which are outlined below, are:

1. Climate change risk on the water sector integrated into key relevant plans and programs.
2. Strategies and measures that will facilitate adaptation to climate change impacts on water resources implemented at the local level.
3. Institutional and human capacity strengthened, and information/lessons learned disseminated.

78. Achieving these Outcomes requires sustainable institutional arrangements that will ensure the adoption of the project's results in the short and long terms. The project, implemented through a National Execution arrangement, will seek to establish a bridge between national authorities responsible of formulating and integrating Climate Change policies, and national, regional and local authorities and practitioners of water resource management. Knowledge and information provided through monitoring



mechanisms, strengthened institutional structures, and pilot projects that will produce information on best practices, will be the key tools to bridge the gap.

79. During the project, strong partnerships will be sought and established with:

- Public, private and international institutions that monitor and produce information related to climate change and water, in order to mainstream climate change considerations in the production and communication of information. Mechanisms for the timely delivery of climate change-related information to specific stakeholders will be designed and implemented.
- Regional and local governments and watershed authorities, NGOs, international technical cooperation bodies, and communities in the selected provinces and watersheds, in order to mainstream adaptation to climate change into national/local planning. This includes the identification and treatment of climate hazards, vulnerability and the design of watershed management policies, productive and sustainable development projects, and the retrofitting of existing projects.
- Basic knowledge and best practices will be compiled, consolidated and translated into educative material and training courses. The executing parties will be competitively selected amongst numerous water-related NGOs and consultancy firms that have been identified during the PDF B phase.
- A group of stakeholders not directly involved in the CNC will be among the project partners. A number of such stakeholders have declared their interest in partnering with national institutions in enforcing national environmental policies and legal frameworks. Some of provincial and local authorities have under their responsibility the management of water resources, for irrigation and domestic use. As such, they constitute key partners for the project to strengthen the adaptation baseline in Ecuador.

**Outcome 1: Climate change risk on the water sector integrated into key relevant plans and programs.**

80. This Outcome corresponds with Outcome 4 in UNDP’s draft global “Monitoring and Evaluation Framework for Adaptation”, namely “New plans and policies based on plausible climate change impacts on water availability and use developed and piloted”

**Baseline (US\$1,200,000 - Co-financing from SENPLADES, CNRH, and leading Provincial Governments<sup>9</sup>)**

81. At present, the water sector in Ecuador is characterized by unclear institutional coordination mechanisms for policy makers, the absence of a clear water resources strategy that takes into account climate change risks, and limited stakeholder participation in decision-making processes. The assessment carried out under the PDF-B phase found that, in spite on a number of on-going relevant initiatives, there is a lack of solid understanding of how climate change would impact water supply and demand. Thus many plans and programmes that affect water resources are being designed or implemented without considering the need to address climate change risks on neither water resources nor adaptation requirements in the water sector. Under this business-as-usual scenario, these on-going initiatives will continue to ignore the threats of climate change including variability in water availability. In turn, the viability of such plans and programmes will be compromised. For instance, Ecuador has developed a

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<sup>9</sup> Discussions with all the relevant institutions that will provide co-financing for the project are currently taken place. Co-financing arrangements will be secured by the time of CEO endorsement.

National Water Management Plan (*Gestion de los recursos hidricos del Ecuador, politicas y estrategias* – currently in a draft form), which does not even acknowledge the climate risks that will have direct impacts in the water sector. Similarly, the National Risk Management Plan, under the Coordination of SENPLADES and published in 2005, makes only brief references to adaptation needs and does so in a generic fashion.

82. However, these ongoing plans and programmes also represent an opportunity to integrate climate change concerns into water management plans and strategies at different levels. Coordination among different government institutions is expected to take place under the new Government to move forward a water development agenda at different institutional levels (national, provincial, etc). This includes the finalization of the national water management plan and the development of a new framework to guide the development of Ecuador.

83. Over the last few years, in the context of state modernization Ecuador has been implementing a policy of decentralization. Ecuador's decentralization law allows for local governments to request the transfer of responsibilities from the central to the provincial and municipal levels. This includes several attributions with respect to water governance and has resulted in strong demands for decentralization. Within a decentralized framework, provincial councils and municipalities will thereby assume an important role in (among others) water resource management by developing public policies, creating an enabling environment for development and participatory processes, and providing support in financial and human resources.

84. Current measures that are being implemented or planned to improve institutional frameworks that are of relevance to adaptation to climate change in the water sector include:

- a. *National water management plan.* The proposed plan is currently in draft form. A review process will take place to improve the plan and involve a wider range of stakeholders. The review process will establish the basis for a more comprehensive water management plan and will represent an opportunity to open the debate on how the plan could incorporate adaptation to climate change in the water sector.
- b. *National Development Plan.* Government has initiated the process of defining Ecuador's development plan for the period 2001-2010, and for formulating a sustainable human development strategy for the 2008- 2020 period. Policy makers at different levels and across sectors are expected to play a key role in the definition of the new development plan. This project will build on the details on the structure and institutional framework for such a plan, as it is developed by working in collaboration with the relevant institutions. The Government has placed a high priority to water governance in the new plans.
- c. *National Risk Management Plan.* The objective of this plan is the formulation of policy guidance to reduce exposures to disasters, with some consideration to climate risks. SENPLADES will be establishing a consultation process with the relevant stakeholders in the water sector to identify ways on how this plan can be operationalized.
- d. *Provincial development plans and risk management proposals.* The provinces that this project will focus on have developed water development plans and risk management proposals. These provide an overall framework for decision-making across sectors, including the water sector, and some general principles for risk management. Neither the provincial plans nor the risk management proposals take into account climate change risk on the water sector. However, they provide a sound basis for the inclusion of such risks (and adaptation needs) into the governance of water at the provincial level.

85. The above baseline activities are expected to provide key contributions to the process of integrating water-related climate risk into relevant national initiatives. However, substantive inputs from the

proposed project are required to ensure that the baseline activities are successfully achieved. In this sense, the project is expected to play a catalytic role in bringing climate change concerns in the water sector to the attention of policy makers through practical and effective actions. These are described in the section below.

### **Additional Cost Reasoning (US\$400,000-SCCF)**

86. Without GEF intervention, water management schemes that address climate change concerns will not be introduced systematically. Responses to address climate change concerns with regards to water resources will likely be adopted on an ad hoc basis, and in response to extreme climatic events that affect water availability and allocation. Currently, there are neither concrete measures nor sufficient institutional capacity to ensure that climate change issues in the water sector are addressed. This project will meet the additional costs of addressing key gaps including i) developing practical guidance to assist relevant water management institutions integrate climate change concerns into the water sector, and ii) incorporating climate risks into relevant water management plans and programmes.

87. SCCF funds will contribute towards ensuring that climate change risks are mainstreamed from specialized forums on climate change to national and local institutions, particularly those involved in regional and local water resource planning and management. With GEF support, climate change risks in the water sector will be integrated into the relevant programmes described above at the national and particularly at the local level. The focus of this project will be on activities in provinces that will be covered under the project, namely Manabi, Los Rios, Azuay, and Loja. These provinces were selected on the basis of a consultative-based vulnerability and capacity assessment undertaken during the preparatory phase.

88. The project will promote collaboration among governmental and non-governmental stakeholders associated with water governance, with the objective of ensuring that climate change risks are appropriately incorporated into the policy making process. Given the lack of understanding and experiences on how climate risks and relevant policy frameworks can be integrated into the water sector, the project will develop a practical approach to facilitating this integration and educate the policy makers along the process.

89. The expected project outputs from the integration of climate change risks issues related to water management plans and programmes include:

*Output 1.1: Practical guidance on the integration of climate risks into relevant water management plans and programmes developed*

90. This output will provide a practical framework to guide the process of integrating water climate change risks and adaptation into relevant water management plans. The guidance will serve as a comprehensive and practical reference on how local water governance institutions can conduct the integration of climate change risks into ongoing strategies and plans more effectively. Key stakeholders both at the central level (MoE, Ministry of Agriculture), the CNRH and SENPLADES) and at the provincial and local levels (Provincial Councils, Water Agencies, Municipal governments, NGOs) will be involved in the formulation of practical measures, taking into account the evolving needs of the institutions and the policy context for the water sector. More importantly, the guidelines will target the needs of the on-going planning efforts mentioned earlier to ensure that this integration will be established as a learning exercise. Thus, the ultimate goal of the guidelines is to effectively assist policy makers in setting up a framework for the integration of climate risk in the water sector. The proposed activities in support of this outcome include:

- 1.1.1 Review of the gaps and opportunities in existing plans to identify viable approaches to the development of the guidance.
- 1.1.2 Set up a consultative process to include key stakeholders in the process of integrating climate concerns into water management plans.
- 1.1.3 Review experiences from other regions and, if available, in Ecuador on similar initiatives to facilitate integration of climate risks concerns in development plans.

*Output 1.2: Relevant plans and programmes incorporate climate risks in the water sector*

91. Informed by the details in output 1.1, output 1.2 will focus on the integration of climate risk in the water sector into the relevant planning process at the national and the provincial level. At the national level, the proposed activities in support of this output include:

- 1.2.1. Revision of key water governance plans described below to incorporate climate change risks in water management:
  - *National Water Management*: Given that the National Water Management plan is already available in draft form, this project will ensure that the revision process will seek to ensure that the basic principles of climate risks on water availability are adequately addressed. The objective is to create the conditions for more effective initiatives of adaptation in the water sector. The plan itself does not intend to cover all aspects of adaptation but rather to bring the priority needs for adaptation interventions at the higher institutional level within the water sector. The project will coordinate with CNRH to assist in the review process, by advising on the climate issues to be considered and providing information on adaptation requirements.
  - *National Development Plan*: The project will take advantage of the fact that relevant institutions are part of the National Steering Committee of this project. These institutions are key participants in the current elaboration of the national development plan, including the National Secretariat of Planning (SENPLADES), the MoE, CNRH, and CONCOPE. These partners will promote the consideration of climate change issues into the National Development Plan. This will ensure that climate risks in the water sector do not become an obstacle to the achievement of related development objectives. Concretely, the project will ensure that the National Development Plan incorporates climate change concerns on water resources by acknowledging (a) the threat posed by climate change and (b) creating an enabling environment (e.g. through legislative changes) that will promote adaptation.
  - *National Risk Management Plan*. The project will work with SENPLADES to assist in the process of updating this plan so that considerations for climate change risk management in the water sector are also included. Given that this National Risk Management Plan provides overall guidance on risk management, SCCF funds will be used to ensure that adequate consideration is given to climate change impacts and adaptation needs on water resources.

92. At the local level, provinces and municipalities have development plans, and some of them also include risk management plans. However, these plans do not take into account risks from climate change. Currently, these plans are implemented based on public priorities and potential investment opportunities by public and private stakeholders. In some selected provinces, actions taken to improve water management and conservation are driven by negative water balance effects, which are partly the result of climate-induced factors. Although there is insufficient public awareness, some actions are undertaken already in important watersheds such as Paute, Jubones, Catamayo and others which are within the boundaries of the project. Reforestation and slope stabilization are the most common action taken.

93. To guarantee the inclusion of climate change risks criteria into provincial and local development plans, the project will develop, with appropriate stakeholder input, an implementation and follow-up strategy to apply the guidelines from output 1.1. The execution of this strategy will result in the integration of climate change concerns into key provincial and local development plans. This will help to facilitate a systematic adoption of climate change adaptation actions related to water management which, together with baseline development programmes, will contribute towards more efficient water use and reduced water supply vulnerability.

94. At the local level, the proposed activities in support of this output include:

- Insertion of climate risk management criteria in the provincial and local water sector plans. The guidelines resulted from output 1.1 will be implemented in at least two of the four provinces of intervention to guarantee the inclusion of climate risks in the water sector into provincial and local development and risk management plans.
- Preparation of a follow up mechanisms to monitor the climate change adaptation actions in the implementation of the development plans.

95. Updating and improvement of provincial and local development plans and provincial risk management plans will be funded through co-financing (as they focus on baseline (non-climate) related risks), but the incorporation of climate change risk information into these plans represent additional interventions that will be supported with SCCF funds. Additional SCCF funding will be used to further strengthen local capacity to mainstream climate change adaptation issues into water management policies and practices.

96. These efforts are essential for facilitating the integration of climate change risks into the national water development agenda. Two national agencies with key roles both in water governance and planning will lead the production of this output: CNRH, which presides over the Water Resources group of the CNC, and SENPLADES, the national planning secretariat. At the local level, Adaptation Councils will be created in the four provinces to lead the integration process in provincial development and risk-management plans.

**Outcome 2: Strategies and measures that will facilitate adaptation to climate change impacts on water resources implemented at the local level.**

97. This Outcome corresponds with Outcome 1 in UNDP’s global “Monitoring and Evaluation Framework for Adaptation”, namely “Development plans/specifications informed by or revised to account for potential impact of climate change on future water resources” and Outcome “2 (or 3)” in UNDP’s global “Monitoring and Evaluation Framework for Adaptation”, namely “Water saving measures (e.g. rainwater harvesting, micro dams, efficient technologies) introduced”

98. The outcome focuses on practical solutions to impending problems at the local level. In the absence of the project, responses to climate change would be reactive and adaptive capacity constrained by lack of a coherent strategy that addresses long-term climatic conditions. Without access to tools to build resilience and the means to put in place appropriate response measures, local organizations and communities will be constrained in their abilities to address specific climate threats on water resources. Field-based adaptation provides opportunities to obtain practical experience and develop best practices. The project will pilot interventions that integrate climate risks into activities which rely heavily on water.

99. The consultative process during the preparatory phase revealed that adaptation measures could be implemented in four provinces, two in the Pacific Coast and two in the Andean region: Manabí, Los

Ríos, Azuay and Loja. The selection was based on the following criteria: (i) the existence of some institutional capacity to mainstream adaptation in existing activities; (ii) past history of extreme climatic events coupled with social vulnerability, (iii) experiences in spontaneous adaptation that could be identified and further developed, and (iv) interest and motivation of local authorities and other stakeholders. The four provinces are also in the process of implementing emergency response plans and risk management measures to improve their preparedness to confront extreme climate events. As such, this project will catalyze substantial baseline co-financing towards the achievement of this outcome.

100. The two pilot interventions implemented by this project focus on integrating climate change risks into water management in activities of strategic importance to Ecuador, namely in agriculture and hydroelectric power. Case 1 refers to the Paute Hydropower plant, located in the province of Azuay. HidroPaute, the company that manages the plant, is currently investing US\$320 millions in incrementing generation with the construction of two additional hydropower plants in the same river: Mazar (190 MW) and Sopladora (312 MW). Case 2 refers to introducing water adaptation measures and technologies in agricultural practices in the provinces of Los Rios, Manabi and Loja.

**Baseline (US\$3,250,000- Co-financing from SegePaute, HidroPaute and the Provincial Governments of Manabi, Los Rios, and Loja)**

101. There are a number of baseline development issues that are of relevance for this outcome and which will form the foundation of the proposed interventions.

- *Development of water resources inventories and provincial information systems.* Local authorities in the selected provinces are carrying out various activities with the objective of putting in place a more effective management scheme for water resources. The most advanced is the Province of Azuay, where the provincial council and other entities such as the Council for the Paute Watershed (CG Paute) and the water utility ETAPA completed the first phase of a water inventory at a cost of US\$125,000. A second phase will be implemented at a cost of approximately of US\$325,000.
- *Local water management initiatives:* Climate extremes on the water sector (i.e. floods and droughts) in the selected provinces have caused significant impacts on local livelihoods. Over the last few years, several NGOs and international/bilateral cooperation programmes have implemented projects to improve local management of natural resources, including the creation of watershed committees. Specific measures include reforestation programmes, building of water reservoirs, and protection of water sources, promoted by provincial entities, municipalities, and community organizations.
- *Local funds for the conservation of water sources in strategic watersheds:* Several trust funds support local actions that promote environmental sustainability. The National Environmental Fund (FAN) represents an important and useful instrument to finance local initiatives in natural resource management. Over the last few years, similar instruments have been developed for water resources, particularly the Water Fund for Quito (FONAG), which represents a significant initiative to mobilize local resources to support actions for the protection of water sources in the Quito Valley. Based on this experience, Cuenca's water utility (ETAPA) and an energy producer company (Elec Austro) have agreed to establish a water fund (with approximately \$410,000 as seed capita) for the Paute watershed. Additional partners, such as other energy utilities, partners in the industrial sector, and Hidropaute are expected to materialize over the coming months. Other entities are exploring the feasibility of adopting a similar mechanism for the Province of Loja. These funds represent an opportunity to support adaptation intervention at the local level.

The GEF project will build on these local initiatives to include adaptation criteria in the funding of projects by the local funds.

102. This outcome will be achieved by building on the efforts of three critical stakeholders: a) Regional Development Corporations, Provincial and Municipal authorities, and watershed-management authorities, all in charge of water-related infrastructure investments and/or of the care of key watersheds; b) International organizations and NGOs involved in technical cooperation and sustainable development institutions, microfinance, and risk management initiatives and projects; c) Communities and local NGOs. Particular attention will be paid to the latter group to facilitate strong involvement of local communities in the design and implementation of this component from the beginning of the project. In each province, the Adaptation Councils (see Outcome 1) will secure the participation of relevant stakeholders and will lead a public awareness strategy to target the relevant groups.

### **Additional Cost Reasoning (US\$2,000,000 - SCCF)**

103. With SCCF support, the project will promote, complement and co-finance technical aspects and concrete measures in four provinces. Interventions will focus on implementation of climate change adaptation strategies in water resources management in two activities (hydropower generation and agricultural practices), provision of financial mechanisms to support adaptation responses in strategic watersheds.

*Output 2.1: Measures, technologies and practices to improve the adaptive capacity of water resources management introduced and implemented in pilot systems.*

104. The pilot interventions in this project will address climate risks affecting water availability for different uses (e.g. agricultural production and/or energy provision). The project will integrate climate change information into the planning and management of a hydro-power facility, and also (with the support of co-financing) in community-based water management measures. Technologies and practices will be modified and/or introduced to increase the resilience of these activities to anticipated changes in the water supply and rain intensity and frequency. Funding for these local adaptation measures will be provided by already-existing funds (FAN, FONAG, Paute Watershed fund) that will receive technical support of the project to help them incorporate climate risk considerations when deciding on which interventions to finance. The project will provide additional funding to help local stakeholders in the elaboration of proposals of concrete adaptation measures. The actual funding of these proposals will be provided through cofinancing by these funds.

*Anticipated activities include:*

#### *2.1.1. Case 1: Improve water management practices in the agricultural sector of selected provinces.*

The project will support improvements such as:

- Implement agricultural practices that lead to water conservation and efficient use. This includes changes in crop patterns, selection of drought-tolerant crops, improving land management techniques, implementing changes in land use.
- Incorporation of water saving technologies for irrigation such as drip irrigation, adjusting timing and volumes of water application in irrigated land, etc;
- Identification and implementation of economic incentives to promote the adoption of climate change adaptation measures by small producers;
- Designing insurance mechanisms to protect producers from the impacts of harvest failures.

- Improving the existing mechanisms for the allocation of water use rights, considering future variations in water supply due to climate change, as well as the need to rationalize water consumption.
- Develop and implement criteria for project formulation and selection, to be funded by the funds described above (FAN, FONAG). The objective of these criteria is to secure that funding for watershed management promotes adaptation to climate change and discourages maladaptation in the water sector.
- Elaboration of a list of prioritized adaptation interventions to be funded with local resources (for instance by FAN and FONAG).

*2.1.2. Case 2: Integrate climate risks into water management practices in a hydroelectric project.*

- In partnership with a private company, HIDROPAUTE S.A., the project will support the application of planning models such as WEAP (Water Evaluation and Planning), which will include details of national climate change scenarios. Such models will help managers to decide upon the allocation of water resources between different sectors, and to consider supply and demand, water quality and ecological needs when planning. Key information on hydro meteorological information of the basin, different uses of water in the area, and systems that are able to forecast the most likely climate change scenarios will be incorporated to enable improved planning of water usage for hydropower production by this plant.
- Implement concrete adaptation measures to improve water inflow to the Paute reservoir. This includes improvement of land management practices in the upper parts of watershed to address seasonal droughts which are becoming more unpredictable and prolonged. These measures will complete ongoing efforts by HidroPaute, such as increasing reservoir capacity, efficiency of turbines and energy efficiency.

*Output 2.2: Information management systems reflecting climate change impacts on the water sector developed*

105. Existing institutional arrangements do not promote the efficient transfer of information between climate information providers and users. This results in problems such as water use permits being administered without any foresight of likely water supply pressures, water development planning failing to account for future water resources availability, and the lack of useful hazard maps. In turn, faulty or insufficient information contributes to the limited awareness of the risks associated with climate change among policy makers, officials in key water management agencies at the central government level and in vulnerable provinces and the general public. This is a serious limitation for the interpretation of climate risks into the design of appropriate policy responses.

106. Without GEF intervention, climate information for water planning and management will not address climate risks and will fail to provide accurate and timely data. Furthermore, the weak capacity to design and put in place appropriate information and knowledge management schemes will represent a key barrier to water management in the context of climate change.

107. SCCF funds will be used to complement ongoing local initiatives to improve the monitoring of water resources by integrating climate information. This includes improving the currently sub-standard hydrological monitoring network (through co-financing), using downscaled climate change scenarios to detect vulnerabilities, producing updated hazard maps in flood-prone regions, especially in the Los Rios and Manabi provinces, and providing support to policy makers in charge of taking decisions about land use and long-term adaptation measures.



108. The project will contribute to the improvement of information management systems through the following activities:

*2.2.1. Include climate change considerations in provincial hydrological inventories (water balances)*

Local authorities in the provinces of intervention have advanced in the compilation of hydrological inventories. The project would finance the incorporation of climate change impacts on inventories, to identify vulnerability of water resources at a scale appropriate to support the design of policies and strategies on water resources management and climate change adaptation at the local level. National institutions like CNRH and INAMHI, and regional entities with responsibilities in water management will be the relevant actors of these processes.

*2.2.2. Strengthen the hydrological and meteorological information networks at the provincial level.*

The project will establish an integrated information system taking into account climate risk and impacts in the water sector in the selected provinces. The current agreements and inter-institutional arrangements will be improved in order to ease the flow of relevant climate-water resources risk information for decision makers, the monitoring of climate risks on water resources and the articulation of information systems with national and regional hydro-meteorological data. Common procedures to collect, archive and manage climate data and climate risk information for the water sector will be designed and implemented. These procedures will strengthen existing early warning systems for floods and droughts.

**Outcome 3: Institutional and human capacity strengthened, and information/lessons learned disseminated**

109. This Outcome corresponds with Outcome 3.1 in UNDP's global "Monitoring and Evaluation Framework for Adaptation" (see Annex 3, Table 2: Adaptation Goals, Objectives and Indicative Outcomes and Indicators for Water Resources and Quality).

***Baseline (US\$1,550,000- Co-financing from MoE, SENPLADES, CNRH, INHAMI, leading Provincial Governments)***

110. In the absence of the project, institutional capacity to address climate risk in water management will continue to be weak. On-going efforts to strengthen national capacity on CC adaptation are circumscribed to the Second National Communication, which covers generic adaptation issues but neither addresses the capacity needed for implementation of adaptation measures on the ground, nor the strengthening of institutional capacity to mainstream adaptation in the water sector. Similarly, no lessons on adaptation to climate change would be generated. The lack of successful and practical adaptation intervention in Ecuador continues to hinder the possibilities of innovative adaptation policy frameworks at the national or local level. Adaptation interventions in Ecuador have been limited to assessments and general description of adaptation measure, which have not produced lessons that can be replicated in different scales. As a result, stakeholders and national institutions have not been able to learn from relevant experiences that can feed into national and local planning to address climate risks in the broader development context. However, the Government is currently developing a strategy to inform the stakeholders on the need to address environmental concerns in the context of human development. For instance, with funding from the Bureau of Crisis Prevention and Recovery, UNDP is working with the Provincial Council and four municipal governments of the Province of Los Rios, to create local capacity for early recovery after seasonal floods.

## **Additional Cost Reasoning (US\$600,000 - SCCF)**

111. Integration of climate change concerns into water management plans and strategies, as well as implementation of adaptation measure on the ground is not a trivial task. They require a comprehensive understanding of the steps needed to prepare the enabling environment, identify specific measures that need to be implemented, information to support the integration process and application of adaptation measures, and the appropriate follow up mechanisms to assess progress and take corrective actions (monitoring and evaluation).

112. SCCF funds will be used to develop institutional capacity to design and implement a more comprehensive and strategic approach to address climate-related risks in the water sector. As a result, incorporation of climate risks into water planning and management is more likely to succeed.

113. All interventions supported by the project will generate lessons of relevance not only to Ecuador but also to other countries facing similar hazards. Consequently, all the costs associated with codifying and disseminating such lessons are eligible for GEF funding. This includes project management and M&E costs.

114. Learning is an important goal of the GEF adaptation portfolio. This project, like others, will implement a significant learning component, using monitoring and evaluation good practices. Rigorous evaluation will enable the GEF and other agencies to measure progress and the GEF to learn how to strengthen and widen its portfolio. The UNDP/ GEF's Adaptation Learning Mechanism (ALM) facilitates this learning process.

115. The ALM is designed to contribute to the integration of adaptation to climate change within development planning of non-Annex I countries, and within the GEF's portfolio as a whole. From the GEF family perspective, sharing knowledge among users will ensure that the GEF portfolio, as a whole, can benefit from the comparative strengths and experience of the various Implementing Agencies. Outputs of this component will include:

*Output 3.1: Improved institutional and technical capacities to support the mainstreaming of climate risks and implementation of adaptation measures in the water sector*

116. Training of personnel in key agencies is essential to build institutional capacity to ensure adoption of appropriate measures and appropriation of the above mainstreaming process. Given the broad range of technical, institutional and policy issues that will be involved in this mainstreaming process, capacity-building activities will target staff at different institutional levels. Ultimately, staff responsible for overseeing the mainstreaming process at different stages and levels, should be able to advise decision makers and other stakeholders to ensure effective integration of climate risks into key water management plans and strategies. Target agencies will include central government agencies such as MoE, MoA, CNRH, INAMHI, SENPLADES; CONCOPE, and FRH as well as the local water agencies of CNRH. Capacity building activities will include training on targeted approaches for mainstreaming climate change risks through information management, knowledge brokering, and mechanisms to promote local innovation in sustainable adaptation measures in water management. The overall capacity building approach will include follow-up procedures to assess impacts and ensure sustainability beyond the life of the project.

117. The proposed activities in support of this output include:

- 3.1.1. Develop and implement a comprehensive capacity strengthening approach addressing among others: (a) use of climate change-water resources risk information in decision making process

in the water sector; (b) linkages between climate risks and development issues for more effective planning and management of water resources; (c) development of follow up mechanism to assess progress of measures adopted as a result of the mainstreaming of climate risks and implementation of adaptation measures on the ground. Training will be conducted both at the national level, targeting policy makers and staff of relevant ministries/institutions, and at the local level, targeting the main stakeholders of the four provinces, including the local communities involved.

- 3.1.2. Identify learning experiences from other relevant initiatives so that capacity strengthening initiatives build on and coordinate with other climate change projects, such as the Second National Communication to the UNFCCC and the Regional Adaptation Project in Ecuador, Bolivia, and Peru (led by the World Bank).
- 3.1.3. Develop a public awareness campaign to increase support for adaptation measures in the water sector. Awareness of the risks associated with climate change is low among all segments of society. A public awareness campaign, targeted at a number of different audiences, including government officials, schools, and the general public will emphasize the potential impacts of climate change, factors increasing vulnerability, and potential solutions. Cooperation with the education departments of the MoE and the Ministry of Education will also be established, in order to mainstream climate change contents into their ongoing educational programmes.

*Output 3.2 Knowledge and lessons learned to support implementation of adaptation measures compiled and disseminated*

118. The project will provide key information on climate change adaptation in a user-friendly way to all relevant local water users and authorities. Once (a) hydrology inventories have been compiled and systems established to continuously reflect and update projections with evolving climate change information, and (b) mechanisms to harmonize climate change adjusted water resources information systems at provincial level are established (under outcome 2), the project will support measures to improve the access to the information by key stakeholders. In cooperation with provincial governments, NGO's and other local interested entities, the project will oversee the creation of a public "observatory" for informing on water management in the context of climate change. This public forum will provide essential information on adaptation options, and serve as a mechanism for dissemination of state of the art knowledge on climate change and water resources. It will serve as a host of periodic meetings to sensitize local stakeholders with relevant information on climate change impacts on water resources and the contribution that key constituents can do to adapt to impending impacts. The project will make use of the UNDP template for compiling lessons learned (see Annex 4), which will be reviewed and adjusted in the context of the project, during the preparatory phase, after the inception workshop.

119. To achieve this activity, the following actions will be supported:

- 3.2.1. *Insert climate change information into training and courses* directed at local water users (for example: this will build on an existing course on integrated water management of CAMAREN)
- 3.2.2. *Create a forum* for the exchange of experiences on integrating climate risks concerns between water users and authorities of different provinces.
- 3.2.3. *Establishment of a project web site.* The site will facilitate exchange of information and dissemination of project experiences and lessons learned. The site will include both public access and restricted-access areas, and will also be linked to the ALM web-site, which will serve as a hub for the GEF's adaptation learning programme. This Internet based tool will be

the main instrument of project information and communication. It will be designed through a wide innovative vision in order to share project's experiences, studies, and documents on a friendly, dynamic and attractive way. The site will include a knowledge network on Climate change and water resources, at provincial level.

- 3.2.4. *Compilation of lessons learned with the participation of key stakeholders.* The project will provide analytical descriptions of experiences, including interim results that will be systematically compiled to provide inputs to the ALM and its learning process.

*Output 3.3: Guidance documents for GEF and MoE on climate change adaptation programming in the water resource sector provided.*

120. The project will highlight possible future areas of investment for the GEF and for the MoE, to improve the quality of policy advice available to water resource sector. The activities that will be developed under this output are:

- 3.3.1. Initial workshops on the intervention sites
- 3.3.2. Periodical visits to monitor on the ground actions
- 3.3.3. Recurrent meetings with all involved actors
- 3.3.4. Reports, statements and briefs of successful and also not successful activities
- 3.3.5. Final report of activities of each intervention site, highlighting recommendations relevant to GEF activities on adaptation
- 3.3.6. Identification of new sites for intervention on climate change and water resources adaptation measures, with recommendation to MoE on replication of experiences, as appropriate.

121. All the outputs referred will need to have GEF financing to guarantee the success of the implementation of the capacity building activities, sharing information and lessons learned, contribution to the ALM, and providing inputs to the GEF on policy issues in the adaptation area, including the monitoring of adaptation activities to measure success on adaptation interventions on the ground. Co-financing for this outcome are related to (i) the monitoring activities by the relevant institutions of the plans and programmes that provide the foundation for mainstreaming water CC issues; (ii) staff cost allocated to ensure sustainability of information dissemination activities and (iii) related capacity building activities to ensure effective implementation of project activities.

122. The costs assumed by the GEF and national counterpart to develop the three outcomes are detailed in Section II, Part I: Additional Costs Matrix.

### *Project Indicators, Risks and Assumptions*

#### Indicators

123. At the level of the project Objective, the indicator will rely on the Vulnerability Reduction Assessment (VRA) methodology, piloted in other GEF adaptation projects, such as the Community-based Adaptation Programme. This is also the recommended indicator in UNDP's global "Monitoring and Evaluation Framework for Adaptation"<sup>10</sup> for Objective 3 (Adaptive Capacity: Institutional capacity of water sector including supply and demand management to respond to long-term climate variability and change enhanced). The advantages of the VRA are:

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<sup>10</sup> See Annex 3 for more detailed description of UNDP Monitoring and Evaluation Framework for Adaptation;

- It is participatory, incorporating the views of key stakeholder groups, regarding changes in their capacity to respond to climate-induced water resource sector issues.
- It generates a unit-less index, which can therefore be used to measure and compare progress at different sites within each country. This allows the project management team globally and within each country to practice adaptive management, utilizing regular assessments of changes in VRA to identify required modifications in the project strategy to maximize impact.

124. At the level of the three Outcomes, indicators are:

Outcome 1: (i) Number of reference to water climate change risks in relevant plans and programmes; (ii) Number of plans and programmes that apply Guidelines; (iii) Number of plans that integrate Climate change risk issues related to water management. The target figures for this indicators are: (i) By the end of year 1, practical guidance to mainstream water climate risk has been made available to relevant stakeholders; (ii) By the end of the project, the National Water Management Plan, National Development Plan, National Risk Management Plan, and at least two Provincial /Risk management Plans include climate change risk and adaptation measures for the water sector.

Outcome 2: (i) Number of adaptation measures implemented at the local level; (ii) Number of communities undertaking adaptation measures; (iii) Number of farmers adopting water saving measures; (iv) Number of climate-induced inflow disruptions in the Paute hydroelectric plant; (v) Number of institutional agreements to improve climate information networks. The target figure for this indicator is: i) By the end of the project, four provinces adopt adaptation measures to address climate risks in the water sector; (ii) By the end of the project, a climate network that includes climate change information is operational in at least two provinces.

Outcome 3: (i) Number of lessons learned systematized; (ii) Number of staff trained on incorporation of climate risks in the water sector into the relevant plans; number of small farmer trained on implementation of adaptation intervention on the ground; number of staff trained at the provincial level on the measurements of impacts of adaptation interventions; (iii) Number of cases included in the ALM. The target figures for these indicators are: (i) Within 6 months of the start of implementation, a publicly accessible web-site will be created; (ii) At the time of project completion, at least 3 examples of lessons learned have been compiled and disseminated; (iii) At the time of project completion, at least 3 examples of best practice generated through the project will be accessible through the ALM.; (iv) At the time of project completion, draft documents will be prepared to guide future GEF and MoE support for interventions on adaptation to climate change including variability; (v) Survey of heads and technical officers of key national and local agencies.

125. For more information and for indicators at the level of Outputs, refer to the logframe matrix in Section 2, Part 2.

### Assumptions and Risks

126. Key assumptions underlying the project design include:

- Stakeholders are able to perceive reductions in vulnerability over the time-scale determined by project duration
- Stakeholders are able to distinguish vulnerability to climate change from baseline weaknesses in water resources management
- The government remains supportive to improved water resource management.
- Turnover of staff does not negate the benefits of training.

- Selected pilot province is best placed to demonstrate the benefits of measures to adapt to climate change.
- Communities are sufficiently homogeneous to support community action.
- Provincial and local development plans are implemented.
- Projects are under implementation long enough for lessons to be transferred to other projects before the end of the project
- ALM becomes operational and effective in time to document best practices from the project.

127. Risks that might affect the success of the project include:

- A series of unusually wet years might weaken the resolve of key stakeholders in addressing water resources issues.
- The slow pace of policy modification may mean that identified policy changes are not implemented in a timely fashion.
- The demonstration projects fail to influence capacity development and policy modification

128. None of these risks are considered to be “high”. The most serious risk, rated “Moderate”, concerns the slow pace of policy modification. The mitigation strategy to address this risk involves early and consistent application of an awareness programme for policy makers, and engagement of senior levels of government in monitoring project implementation.

129. All other risks are considered to be “Low”, and do not warrant a mitigation strategy.

*Expected global, national and local benefits*

130. Adaptation to climate change projects must take into consideration on the ground interventions at the local level, since in Ecuador, after all the success of adaptation policy, measures and strategies will be measured in terms of increased awareness, preparedness and resilience to climate hazards in local communities. Field-based activities in adaptation are important because they provide opportunities to obtain practical experiences which could be improved. Adaptation opportunities can also be found in on-going initiatives.

131. The project will focus it’s on the ground interventions on water management in the sensitive areas and vulnerable populations. This capacity development component will be devised to raise awareness of climate risks, and increase preparedness and prevention policies at the local level.

132. The project will benefit local communities in the pilot provinces and regions, by improving the reliability of water supply for agricultural production, especially for small farmers, and for a key hydropower project. More reliable water supplies will also improve agricultural yields, thus increasing average incomes and improving nutrition. Also, the production of energy for the country as a whole will be more reliable in the long term. The replication of interventions in the pilot provinces will extend these benefits to other rural communities in Ecuador. Lessons learned from the intervention in the Paute Hydropower project will be shared with the Ministry of Energy and the CONELEC (National Council of Electrification), in order to mainstream climate change adaptation into the design of hydropower projects, and also will improve planning to meet future energy needs.

*Country Ownership: Country Eligibility and Country Drivenness*

133. Ecuador ratified the UNFCCC through a Congressional Resolution dated January 6th 1993, which was published as Executive Decree No. 565 in the Official Journal No. 148, March 16th 1993. The

Kyoto Protocol was also signed and ratified by Ecuador in December 1999 (Official Journal No. 342, December 20th, 1999). The technical focal point for the UNFCCC and the Kyoto Protocol is the Under-Secretary of Environmental Quality at the Ministry of Environment of the Republic of Ecuador. The GEF Operational Focal point has been consulted during the preparatory phase and is fully up to date on the details of the proposed project. The project has been endorsed by the GEF Operational Focal Point.

134. In recent country studies such as the National Communications to the UNFCCC and the NCSA, water governance has emerged as a growing public concern and the impact of climate change has been defined as a critical cross cutting issue affecting the most vulnerable sectors of the economy.

135. Climate Policy in Ecuador dates back to the early 1990s, as it became clear the country was particularly vulnerable to the effects of climate change. Following the UNFCCC ratification in 1993, the INAMHI led the Climate Change Process in Ecuador Project (PCCE). This initiative brought for the first time the issue of climate change to the attention of public policy makers in Ecuador. This initiative generated a flurry of other projects including:

The Ecuador Climate Change Country Study (EPA).

- a) A Dutch funded project on the impact of CC on the coastal region.
- b) UNITAR's Climate Change Training Programme - Ecuador (CC Train).
- c) UNEP's Programme for Offsetting of GHG emissions in Ecuador (UNEP-RISO).
- d) UNDP-GEF technical support for Stages I and II of Ecuador's National Communication to the UNFCCC.

136. Following a training programme by UNITAR, the Government of Ecuador created the Climate Change Unit, hosted by the Under-Secretary for Environmental Quality in the MoE and the CNC. The MoE chairs the CNC, and the INAMHI serves as its secretariat. Other institutions taking part in it are the Ministry of Energy and Mines, the Ministry of Foreign Affairs, and representatives from the National Council of Higher Education (CONESUP), the NGO community, and the private sector. It has functioned as the main forum for discussing climate policy in Ecuador, and conducted the First National Communication (FNC) to the UNFCCC in 2000. The CNC guarantees the conditions for a broad-based national ownership of the process leading to the SNC.

137. Faced with heightened policy debate surrounding the management of water resources, the CNRH, produced in 2002 a policy position document, proposing a decentralized water governance structure, in the form of a National Policy and Strategy for Water Resources in Ecuador. The new policy establishes 9 major watersheds as territorial units for water management. Each watershed would have an authority which would issue water rights concessions (water is a public property in Ecuador) and permits for liquid waste disposal. The authority would also plan and control the use of water resources. Local and regional stakeholders would be part of the authority. This proposal also seeks to strengthen the CNRH, which would be presided by the Ministry of the Environment, and not the MoA as is now the case.

138. The NCSA process stresses that considerable opportunities for integrating climate change adaptation into the policy arena are being lost due to lack of inter-institutional coordination and insufficient national and local capacities in this area. The NCSA process provided an opportunity to engage a wide range of stakeholders at the national and regional level.

139. In 2001, the First Forum on Water Resources laid the foundation of what has become an important public arena for discussions on water policy. The Fourth National Forum on Water Resources was held in 2006 and brought together over 1800 participants from around the country to discuss issues related to water governance and national policy. This forum offers a unique framework through which to mainstream climate change concerns into the emerging agenda on water in Ecuador.

## *Sustainability*

140. The concept of sustainability differs for adaptation to climate change projects, compared with other types of GEF-funded projects. This is because adaptation projects seek to raise the adaptive capacity to long-term climate change. Consequently, raised adaptive capacity automatically implies sustainability. Of greater concern is the risk that the raised adaptive capacity is eroded over time such that as the impacts of climate change are experienced, the benefits secured through the GEF project are not realized. To avoid this situation, the project design relies on the following elements:

- A commitment to long-term planning at all levels, from strategies (such as promotion of inter-sectoral decision-making through inter-sectoral fora), to policies (such as projection of water supply for hydropower projects), to specific measures (such as pre-defined action plans for dealing with floods).
- Building of multi-sectoral teams, to allow climate-change adaptation to be integrated into planning in a wide range of sectors;
- Explicit consideration of costs and benefits, with endorsement of strategies, policies and measures only if they can be expected to provide overall net benefits to sustainable development;
- Commitment to continuous monitoring and regular evaluation of interventions over time; and inclusion of awareness-building and fund-raising amongst national and international agencies and donors as a core activity.

141. In the case of Ecuador, project sustainability turns on the initiative's effectiveness influence over existing water governance structures and integrating adaptation into national policies. In the context of decentralization, it will also require the project to be rooted in regional and local institutions. Successful mainstreaming of climate change concerns into national and regional development planning will facilitate sustainability of the climate change agenda in the long-term. Activities in support of the adaptation agenda to climate change will be integrated into the mainstreaming of planning, as decision support mechanisms, and this is expected to facilitate its long-term sustainability. Public awareness and outreach activities will also help to build the institutional and political support needed to facilitate mainstreaming after project completion.

142. The concept document establishes that the project will focus on capacity development of local actors and institutional building through existing networks. This will constitute an important step to insure sustainability beyond the project term. Securing support from key political and other leaders for adaptation and the water resources management is crucial. The CNRH, the head of the water authority, and leaders of businesses (i.e. agro industry representatives) and non-governmental organizations (i.e. the National Water Resources Forum) can play a critical role in defining and communicating the set of core values that will guide adaptation and catalyse the process. Combined with on the ground-experiences with local water boards and municipal authorities, it is hoped that the project will develop long-term capacities to manage future climate risks at the local level.

143. Finally, the global flow of information on climate change has markedly increased national consciousness about climate change, its causes and impacts<sup>11</sup>. A positive attitude towards "doing

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<sup>11</sup> An internet search of national newspapers showed a marked increase of references to climate change (see Annex 3 for a list of articles and references in the media.)



something” to address climate change can be noticed at all levels. This will improve the chances of success of the proposed adaptation measures.

### *Replicability*

144. Climate change adaptation is at an early stage of development both in Ecuador and in the region. This project is therefore explicitly designed to pilot adaptation in Ecuador subject to the broadest possible range of climatic vulnerabilities to different kinds of water governance issues, but which have reasonable capacity in terms of infrastructure and human resources. By developing systemic capacity while demonstrating adaptation measures on the ground, the project will establish the conditions necessary for replication and scale up.

145. The project will seek to show practical results that can be immediately applied. The projections of water supply in the face of climate change for the Paute Hydropower project will enable its management to immediately design and adopt adaptation measures. Lessons learned can be immediately applied in other major hydropower projects, like Agoyan and Daule-Peripa, and in medium-sized and small hydropower projects like Abanico, Sibimbe, and Rio Calope. New projects, like the Coca-Codo Sinclair (approx. 859 Megawatts), Mazar and Sopladora, will benefit from the conclusions reached in this project.

146. The identification of vulnerable zones has taken into account the geographic location in relation to climatic conditions and risks to which it is exposed: Manabí is a coastal zone which is particularly susceptible to droughts and floods. The lessons learned from the pilot projects will be especially valuable for replication in other areas of the country.

147. Further, the design and eventually lessons learnt from the project will contribute to further adaptation learning, and implementation of effective climate change adaptation in other vulnerable countries. The project will make use of the GEF Adaptation Learning Mechanism, to ensure that the lessons learnt from the project contribute to, and benefit from, experience in adapting to climate change across the whole of the GEF portfolio.

### *Linkages with other programmes and action plans at regional and sub-regional levels*

148. This project will ensure linkages with relevant initiatives, including:

- The Second National Communication (SCN), whose objective is to report to the UNFCCC on national efforts to address climate change, to formulate a national strategy, and to identify priorities for mitigation and adaptation, including potential projects for funding in these areas. The SNC will carry out vulnerability and adaptation assessments, and will identify priority measures and policies to build resilience in different sectors. Given the high complementarity between the SNC and this project, especially as both will be housed at MoE, close coordination among the project managers and the technical teams will be established from the beginning. The SNC is expected to generate impact studies that could feed into the design of adaptation strategies, and has already established a climate steering committee which will also form part of the project’s consultation strategy.
- The GEF-World Bank Regional Adaptation Project (Bolivia, Ecuador, Peru), whose objective is to implement adaptation measures to meet the anticipated impacts from the catastrophic glacier retreat induced by climate change. The Project is centred in interactions between high-altitude ecosystems, tropical glaciers and the production of water in the Andean Region. In Ecuador, the project will address the impacts in the production of drinking water for the city of Quito. Local interventions will aim at foster adaptation in the management of small watersheds originated in the Antizana volcano.

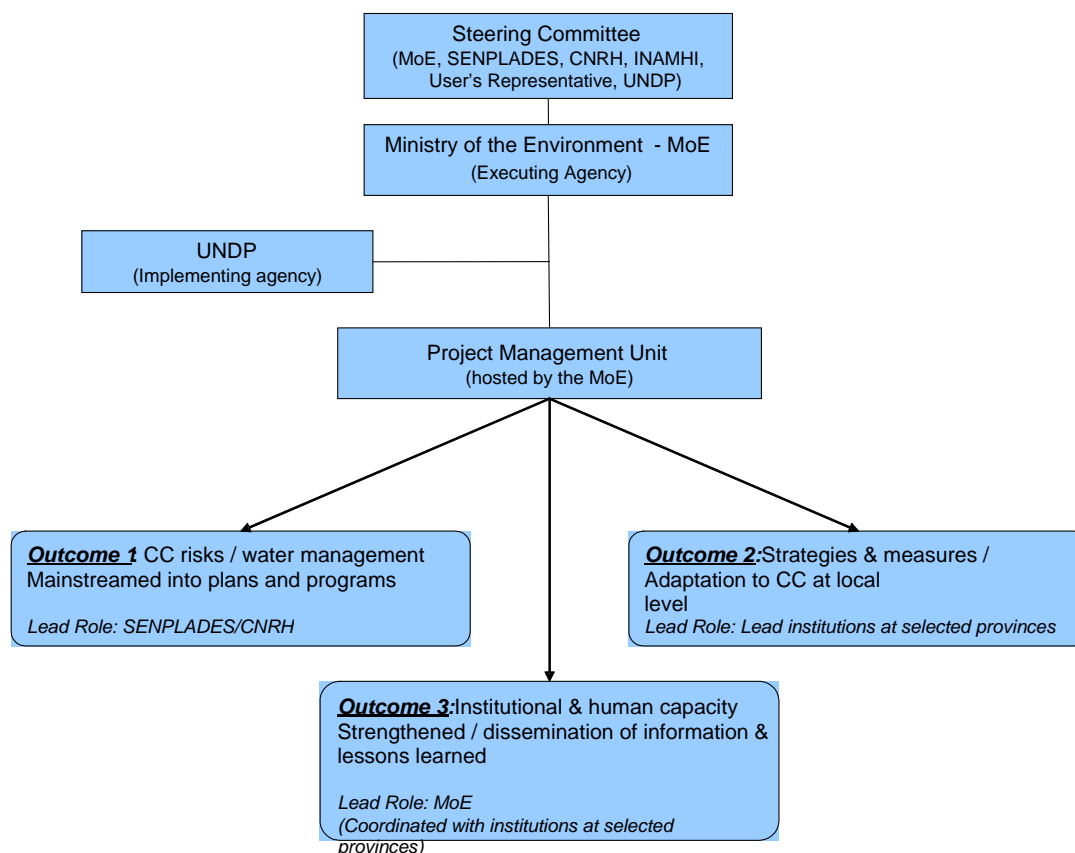
Key partners of the project include the Municipality and the water facility of Quito. Both projects will take advantage of synergies, mainly climate information and scenarios, the use of similar tools such as the WEAP model. The fact that the MoE is the executing agency in both projects has already facilitated agreements with national institutions like INAMHI and CNRH. MoE will ensure that information is shared between projects and that both projects provide information and feedback to the CNC. The UNDP-GEF project outcomes do not overlap with the World Bank project. Both projects, however, will complement one another.

- United Nations Peace and Development Programme in the Northern Border Zone of Ecuador. The Peace and Development Programme (PDP) represents an integral and territory-based approach to address the specific challenges of the Northern Border Zone of Ecuador (NBZ). The PDP strategy seeks to diminish the vulnerability of the northern border zone through strengthened and increasingly strategic inter-agency coordination that links humanitarian to development concerns and, as such, provides a coherent conflict sensitive framework that guides numerous UN programmes and projects from 12 different UN agencies in the NBZ. The PDP's main focus is to strengthen national and local capacity of Ecuadorian counterparts and, as a strategy, to build sustainability. The PDP prioritizes support and institutional strengthening of both governmental and civil society counterparts at different levels, and promotes the strengthening of linkages within and between these distinct levels. Amongst its activities, the project will support bi-national watershed management, specifically in the Carchi-Guaitara basin which has been prioritized both by the governments of Ecuador and Colombia.
- The Los Rios Early Recovery project, executed by UNDP with co-financing by BCPR, seeks to support the recovery capacity of municipalities particularly vulnerable to seasonal floods. The project has established links with the PDF B, providing support in identifying partnerships and synergies. This and the PDP project above will provide valuable lessons on how development priorities can be strategically linked with environmental concerns. They will also be used to learn on the approaches adopted to involve municipalities and organised communities into active participation to ensure ownership of project activities and thus longer-term sustainability.

### **PART III: Management Arrangements**

149. The project will be implemented through a National Execution arrangement. Implementation arrangements seek to establish a bridge between national authorities responsible of formulating and integrating Climate Change policies, and national, regional and local authorities and practitioners of water resource management. Knowledge and information provided through monitoring institutions and best practiced and lessons learned through the implementation of pilot projects will be the tools to ensure effective coordination and follow among the institutions involved in the project.

150. The proposed governance structure for the project and the division of responsibilities among the key institutions are represented in the figure below:



151. The executing agency of the project will be the MoE, which is also the GEF's national focal point. At the time of the approval of the PDF B resources, it was suggested that an institution with on-the-ground experience and mandate for water management, (such as the National Council on Water Resources -CNRH) should be the executing agency of this project, However, it is important to note that the new Government is modifying the water institutional framework and CNRH is actually undergoing important structural changes. New options are currently being considered for the water institutional structure at the national level. Thus CNRH may be placed either under the leadership of the national planning agency, SENPLADES, which has been strengthened under the new government, or under the MoE, which is also playing a more important role in natural resources management. The changes in the institutional structures are expected to be consolidated in the coming months.

152. Discussions among the main stakeholders during the PDF phase of the project took into account the different scenarios for the future institutional structure in the water sector in order to identify the most suitable institution for a successful implementation of the project. The discussions concluded that MoE is best suited in the current political context, to execute the project, given its broader mandate to guarantee that environmental concerns and development priorities are closely interlinked at the policy level. In addition, MoE forms part of the board of CNRH, and its role in the water sectors will be strengthened as part of the restructuring of water management structures.

153. The execution arrangements, however, will favour a multi-institutional approach led by MoE. This approach seeks to build on the technical water expertise already available in the country, such as in CNRH, and the political momentum for a broader national planning effort that is currently talking place in Ecuador. Besides, coordination mechanisms will be established with CONCOPE, the association of

Provincial Councils, and AME, the Association of Ecuadorian Municipalities, in order to secure the dissemination of information amongst all the provinces and cities of the country

154. MoE will assume an important role in the elaboration of the National Development Strategy that will be lead by SENPLADES. The formal linkages of MoE with these two institutions will ensure the necessary coordination with the key stakeholder in the water sector and will facilitate an expedited initiation of the project. MoE is also well placed to coordinate and lead the process of mainstreaming adaptation to climate change in the national agendas. MoE will closely work with SENPLADES during the formulation of the National Development Strategy, as it will represent a unique opportunity to mainstream adaptation to climate change in water management - a critical element for the success and sustainability of the project. As CNRH completes its planned transition, MoE, through this project, will bring significant support and guidance to assist CNRH in incorporating climate change considerations into water management.

155. In its capacity as Executing Agency, the MoE will be responsible for the technical and financial execution following UNDP proceedings. It will be responsible for: (i) directing the project, (ii) meeting its stated outcomes and projected outputs in a timely manner, and (iii) making effective and efficient use of the financial resources allocated in accordance with the Project Document. The Under-secretariat of Environmental Quality would be the official institutional focal point. The Executing Agency will request from UNDP all financial funds and the accomplishment of selection and bidding processes in accordance with UNDP proceedings. As part of the activities and budget monitoring, UNDP will present annual financial statements relating to the status of UNDP/GEF funds (CDR) as registered in the ATLAS system. These statements will be certified by the executing Agency. In addition, UNDP will be in charge of selecting a recognized independent auditor that will conduct an annual audit of the project execution, according the procedures set out in relevant documents. The cost of these audits will be charged to the project budget.

156. Overall guidance and support for the project will be provided by a National Steering Committee (NSC), with the participation of MoE, SENPLADES, CNRH, INAMHI, UNDP and a representative from water users.

157. The National Steering Committee will have the following responsibilities and objectives:

- To take part in the selection of the project coordination team.
- To approve annual reports and operative plans presented by the project team;
- To agree on a common monitoring system, and a minimal set of indicators;
- To serve as a platform for exchange of experiences and lessons learnt;
- To provide a key inter-institutional coordination platform, to define the basic project implementation rules and the roles and responsibility of each executing agency and to allow for the resolution of disputes between different project partners.

158. A project management unit (PMU) will be established in the Under-secretariat. The Project Coordinator, who will be hired through a competitive selection process following UNDP procedures, will head this unit. The PMU will receive specific training on UNDP procedures upon its establishment. The unit will co-ordinate, supervise, assist, control, monitor and report on project execution and budget, and is responsible of reporting to the Undersecretary and UNDP on a regular basis. . The Project Coordinator, in accordance with UNDP formats and guidelines, will prepare the Annual Work Plan (AWP) reflecting project activities and outcomes. In addition to the AWP a detailed activity work plan will indicate the implementation periods of each activity and the parties responsible for carrying them out. The Project Coordinator will also be the registered signatory under delegation of the Ministry of Environment. The

Project Coordinator will be responsible for the conduction of the project preparation process and for the completion of the project brief and of the other expected products. The Project Coordinator will work under the direct supervision of the MoE, and will be accountable before the National Steering Committee.

#### Execution Arrangements by Outcomes

As explained earlier, MoE will be the executing agency of the project and will have a coordinating role of the entire project. However, project outcomes will be executed by leading institutions best placed to achieve the results sought by the project. CNRH and SENPLADES will be responsible for Outcome 1: Climate change risk on the water sector integrated into key relevant plans and programs.

The provincial governments of Manabí, Los Ríos and Loja will lead the execution of activities of Outcome 2: Strategies and measures that will facilitate adaptation to climate change impacts on water resources implemented at local level. In the province of Azuay, the Water Management Council for the Paute Watershed (CG Paute) will lead the intervention in the Paute basin. CG Paute is a multistakeholder entity that includes: (i) representatives of the MoE in the province of Azuay, (ii) local governments (e.g. the provincial government of Azuay, municipalities located in the Paute watershed), (iii) universities, (iv) main water users (e.g. Hidropaute S. A., Elecaastro, ETAPA), (v) private sector (e.g. the Production Chambers).

In implementation of the Outcome 3: Generation and dissemination of information on climate change and impacts and water resources generated and disseminated among water planners, the MoE will facilitate the flow of information between project participants, as well as the dissemination of studies, data and lessons learned generated by the project activities. Building networks amongst project participant will be a key issue to meet this outcome.

The National Institute of Meteorology and Hydrology (INAMHI) will have a lead role in climate data and observation, early warning system, along with the Navy's Oceanographic Institute (INOCAR) and the International Center for Research of El Niño phenomenon (CIIFEN). Coordination with the World Meteorological Organization, through its Global Climate Observation Systems Programme (GCOS) and United Nations Environment Programme (UNEP) will be established given the expertise and relevant initiatives of these organisations in climate data around the world.

The above national institutions will be instrumental in designing and implementing an information management system that meets stakeholders' needs. The National Secretary of Planning and Development (SENPLADES) will play a key role in leading the process of mainstreaming climate change issue into the National Agenda, and provide technical expertise in risks and planning. The project will work closely with the Bureau for Crisis Prevention and Recovery of UNDP in order to build on the tools and expertise already available for risk management. Details of the implementation arrangements are outlined in the relevant section below.

#### *UNDP as Implementing Agency for the Project*

159. In Ecuador, UNDP supports national efforts towards meeting the Millennium Development Goals by sharing knowledge and best practices learned from UNDP global knowledge network. UNDP contributes actively towards the establishment of alliances between central government agencies, local governments, social organizations, agencies of the UN System and other multi- and bilateral donors. UNDP has supported the development of national capacities to develop climate change mitigation and adaptation policies since the elaboration of Ecuador's First National Communication to the UNFCCC and through the execution of the NCSA – Phase 1 project. Through the Small Grants Programme, UNDP has acquired direct on-the-field experience in the implementation of community-level climate change projects such as passive solar heating and cooking, alternative transportation systems, and production of biogas. UNDP is the implementing and coordinating agency for a major multi-stakeholder project for the electrification of the Galapagos Islands with renewable energies, where an investment of 5 million dollars

by GEF has been met with more than 25 million dollars in co-financing. UNDP has capacities that constitute true comparative advantages in the context of cooperation in Ecuador. UNDP is also currently initiating a process to mainstream climate change concerns into development initiatives supported by UNDP Ecuador. Among other comparative advantages that UNDP has in the context of the project, these the following stand out:

- The provision of flexible, effective, opportune technical assistance focused toward strengthening institutional capacities both at the national and local level.
- A well-established capacity to mobilize resources for development at the national and local level in Ecuador.
- Access to global information networks, experience and knowledge that can be used to strengthen the implementation of the project.
- Neutrality, credibility and social trust aimed at facilitating agreements and prevention and mediation of social conflicts. Given the number of government and institutions at the central and provincial level, as well as the local communities and other agencies to be involved, UNDP is well placed to mediate in potential conflicts among these stakeholders.

#### **PART IV: Monitoring and Evaluation Plan and Budget**

160. Project monitoring and evaluation will be conducted in accordance with established UNDP and GEF procedures, which will involve the UNDP Country Office (UNDP-CO) for country-level monitoring, and the MoE at the project level. The Logical Framework Matrix provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis on which the project's Monitoring and Evaluation system will be built.

161. The following sections outline the principle components of the Monitoring and Evaluation Plan and indicative cost estimates related to Monitoring and Evaluation (M&E) activities. The project's Monitoring and Evaluation Plan will be presented and finalized at the Project's Inception Report following a collective fine-tuning of indicators, means of verification, and the full definition of project staff M&E responsibilities.

#### **Monitoring and Reporting**

##### Project Inception Phase

162. A Project Inception Workshop will be conducted with the PMU, members of the MSG, the CNC and of the water resources and climate change workgroup of the CNC, representatives from the participating provinces, other relevant government counterparts, co-financing partners, the UNDP-CO.

163. A fundamental objective of this Inception Workshop (IW) will be to assist the entire project team to understand and take ownership of the project's goals and objectives, as well as finalize preparation of the project's first annual work plan on the basis of the log frame matrix. This will include reviewing the logframe (indicators, means of verification, assumptions), imparting additional detail as needed, and on the basis of this exercise finalize the Annual Work Plan (AWP) with precise and measurable performance indicators, and in a manner consistent with the expected outcomes for the project.

164. Additionally, the purpose and objective of the IW will be to provide a detailed overview of UNDP-GEF reporting and M&E requirements, with particular emphasis on the Annual Project Implementation Reviews (PIRs) and related documentation, the Annual Project Report (APR), Tripartite Review Meetings, as well as mid-term and final evaluations. Equally, the IW will provide an opportunity

to inform the project team on UNDP related budgetary planning, budget reviews, and mandatory budget rephrasing.

165. The IW will also provide an opportunity for all parties to understand their roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference (ToR) for project staff and decision-making structures will be formulated prior to CEO endorsement.

#### Monitoring responsibilities and events

166. A detailed schedule of project review meetings will be developed by the Project Management Unit (PMU) in consultation with the National Steering Committee and incorporated in the Project Inception Report. Such a schedule will include: (i) tentative time frames for Tripartite Reviews, Management Support Group, and (ii) project related Monitoring and Evaluation activities.

167. Day to day monitoring of implementation progress will be the responsibility of the National Coordinator based on the Annual Work Plan and its indicators. The National Coordinator will inform the UNDP-CO and MoE of any delays or difficulties faced during implementation so that the appropriate support or corrective measures can be adopted in a timely and remedial fashion.

168. MoE will fine-tune the progress and performance/impact indicators of the project in consultation with the MSG at the IW. Specific targets for the first year implementation progress indicators together with their means of verification will be developed at this Workshop. These will be used to assess whether implementation is proceeding at the intended pace and in the right direction and will form part of the AWP. The local implementing partners will also take part in the IW in which a common vision of overall project goals will be established. Targets and indicators for subsequent years will be defined annually as part of the internal evaluation and planning processes undertaken by the MoE and the MSG.

169. Measurement of impact indicators related to global benefits will occur according to the schedules defined in the IW and tentatively outlined in the indicative Impact Measurement Template. The measurement of these will be undertaken through subcontracts or retainers with relevant institutions to be determined during the IW or through specific studies that are to form part of the projects' activities or periodic sampling.

170. Periodic monitoring of implementation progress will be undertaken by the UNDP-CO through quarterly meetings with the National Coordinator, or more frequently as deemed necessary. This will allow parties to take stock and to troubleshoot any problems pertaining to the project in a timely fashion to ensure smooth implementation of project activities.

171. UNDP CO and the MoE, as appropriate, will conduct yearly visits to field sites, or more often based on an agreed upon schedule to be detailed in the projects' Inception Report / AWP to assess progress. Any other member of the National Steering Committee can also accompany, as decided by the MSG. A Field Visit Report will be prepared by the CO and circulated no less than one month after the visit to the project team, all MSG members, and MoE.

172. *Annual Monitoring* will occur through the Tripartite Review (TPR). This is the highest policy-level meeting of the parties directly involved in the implementation of the project. The project will be subject to TPR at least once every year. The first such meeting will be held within the first twelve months of the start of full implementation. The National Coordinator will prepare reports that will be compiled into APR by the MoE at least two weeks prior to the TPR for review and comments.

173. The APR will be used as one of the basic documents for discussions in the TPR meeting. The CNRH will present the APR to the TPR, highlighting policy issues and recommendations for the decision of the TPR participants. The MoE also informs the participants of any agreement reached by stakeholders during the APR preparation on how to resolve operational issues. Separate reviews of each component may also be conducted if necessary.

#### *Terminal Tripartite Review (TTR)*

174. The TTR is held in the last month of operations. The MoE is responsible for preparing the Terminal Report and submitting it to UNDP and the GEF Secretariat. It shall be prepared in draft at least two months in advance of the TTR in order to allow review, and will serve as the basis for discussions in the TTR. The TTR considers the implementation of the project as a whole, paying particular attention to whether the project has achieved its stated objectives and contributed to the broader environmental objective. It decides whether any actions are still necessary, particularly in relation to sustainability of project results, and acts as a vehicle through which lessons learnt can be captured to feed into other projects under implementation or formulation.

175. The TPR has the authority to suspend disbursement if project performance benchmarks are not met. Benchmarks will be developed at the IW, based on delivery rates, and qualitative assessments of achievements of outputs.

#### *Project Monitoring Reporting*

176. MoE will be responsible for the preparation and submission of the following reports that form part of the monitoring process.

##### *(a) Inception Report (IR)*

177. A Project IR will be prepared immediately following the IW. It will include a detailed First Year/ AWP divided in quarterly time-frames detailing the activities and progress indicators that will guide implementation during the first year of the project. This Work Plan would include the dates of specific field visits, support missions from the UNDP-CO or the MoE or consultants, as well as time-frames for meetings of the MSG. The Report will also include the detailed budget for the first full year of implementation, prepared on the basis of the AWP, and including any monitoring and evaluation requirements to effectively measure performance during the targeted 12 months time-frame.

178. The IR will include a more detailed narrative on the institutional roles, responsibilities, coordinating actions and feedback mechanisms of project related partners. In addition, a section will be included on progress to date on project establishment and start-up activities and an update of any changed external conditions that may effect project implementation.

179. When finalized, the report will be circulated to project counterparts who will be given a period of one calendar month in which to respond with comments or queries.

#### *Annual Project Report (APR)*

180. The APR is a UNDP requirement. It is a self -assessment report by project management to UNDP and provides input to the TPR. An APR will be prepared on an annual basis prior to the TPR, to reflect progress achieved in meeting the project's AWP and assess performance of the project in contributing to intended outcomes through outputs and partnership work.



The format of the APR is flexible but should include the following:

- An analysis of project performance over the reporting period, including outputs produced and, where possible, information on the status of the outcome
- The constraints experienced in the progress towards results and the reasons for these
- The three (at most) major constraints to achievement of results
- AWP, CAE and other expenditure reports (ERP generated)
- Lessons learned
- Clear recommendations for future orientation in addressing key problems in lack of progress

***(a) Project Implementation Review (PIR)***

181. The PIR is an annual monitoring process mandated by the GEF. It has become an essential management and monitoring tool for project managers and offers the main vehicle for extracting lessons from ongoing projects. Once the project has been under implementation for a year, a Project Implementation Report must be completed by the MoE, in cooperation with National Coordinators. The PIR can be prepared any time during the year (July-June) and ideally prior to the TPR. The PIR should then be discussed in the TPR so that the result would be a PIR that has been agreed upon by all partners.

***(b) Quarterly Progress Reports***

182. Short reports outlining main updates in project progress will be provided quarterly to the local UNDP CO and the MoE by National Coordinators.

***(c) Periodic Thematic Reports***

183. As and when called for by UNDP or the GEF Secretariat, MoE will prepare Specific Thematic Reports, focusing on specific issues or areas of activity. The request for a Thematic Report will be provided to the MoE in written form by UNDP and will clearly state the issue or activities that need to be reported on. These reports can be used as a form of lessons learnt exercise, specific oversight in key areas, or as troubleshooting exercises to evaluate and overcome obstacles and difficulties encountered. UNDP is requested to minimize its requests for Thematic Reports, and when such are necessary will allow reasonable timeframes for their preparation by the project team.

***(d) Project Terminal Report***

184. During the last three months of the project MoE will prepare the Project Terminal Report. This comprehensive report will summarize all activities, achievements and outputs of the Project, lessons learnt, objectives met or not achieved, structures and systems implemented, and will, thus provide an assessment of the project's performance during its lifetime. It will place emphasis on the analysis of the water governance scheme adopted to manage water resources in the context of a changing climate, highlighting the potential contribution of such scheme to national development in relevant areas. It will also provide recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's activities.

**Independent Evaluation**

185. The project will be subjected to at least two independent external evaluations as follows:

***(i) Mid-term Evaluation***

186. An independent Mid-Term Evaluation will be undertaken at the end of the second year of implementation. The Mid-Term Evaluation will determine progress being made towards the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The ToR for this Mid-term evaluation will be prepared by MoE based on guidance from UNDP's Office of Evaluation.

**(ii) Final Evaluation**

187. An independent Final Evaluation will take place three months prior to the terminal tripartite review meeting, and will focus on the same issues as the mid-term evaluation. The final evaluation will also look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental goals. The Final Evaluation should also provide recommendations for follow-up activities. The ToR for this evaluation will be prepared by MoE based on guidance from UNDP's Office of Evaluation.

**Learning and Knowledge Sharing**

188. Results from the programme will be disseminated within and beyond the programme intervention zone through a number of existing information sharing networks, in particular, the ALM. The ALM lessons learned template will be adapted to be used by the project.

189. Learning is an important goal of this GEF pilot phase on adaptation. Each adaptation project should incorporate a significant learning component in its project design, using monitoring and evaluation good practices. Rigorous evaluation will enable the GEF and other agencies to measure progress and the GEF to learn how to strengthen and widen its portfolio. The UNDP/GEF's ALM has been launched to facilitate this learning process.

190. ALM will help maximize global learning from GEF's Strategic Priority on Adaptation (SPA), Least Developed Countries Fund (LDCF), and SCCF. It will contribute to incorporating adaptation into planning and provide good practices for adaptation. Developed as a new "knowledge base", the ALM will provide tools and establish a learning platform. It will be designed as a collaborative, open-source knowledge network with Southern institutions in the lead. Partners include the Stockholm Environment Institute (SEI) and the Regional and International Networking Group (RING).

191. The ALM is designed to contribute to the integration of adaptation to climate change including variability within development planning of non-Annex I countries, and within the GEF's portfolio as a whole. To support this goal, adaptation-related activities should generate knowledge that can help guide implementation of the GEF's adaptation to climate change initiatives. From the GEF family perspective, sharing knowledge among users will ensure that the GEF portfolio, as a whole, can benefit from the comparative strengths and experience of the various Implementing Agencies.

(1) Lessons learned from projects should be classified into the following criteria. Does the adaptation response address:

- Climate change including variability (inter-annual and/or multi-decadal) risks?
- Single sectoral and/or socio-economic issues?
- Ecosystems?

(2) What are the best practices in:

- Integrating adaptation into national and local development policy?
- Project design and implementation mechanisms?

192. The above should include lessons on how to prioritise adaptation options (strategies/policies or operations), the scope of the adaptation project (local, sub-regional, national to sub-regional scales), and capacity development approaches on adaptation, including engaging key stakeholders on adaptation. This will also include lessons on project-level impact indicators.

(3) Share knowledge and experiences on adaptation, especially lessons learned on the following:

- Which are the most common barriers to adaptation, at the information supply or uptake end? (What lessons emerge that has relevance to the role of UNDP, GEF and/or local partners with respect to designing and implementing adaptation project)?
- What are the conditions for success (or failure), including replication and scaling up?
- When do current coping strategies become ‘off-limit’, and over what time scales?

193. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. Identifying and analyzing lessons learned is an on-going process, and the need to communicate such lessons as one of the project's central contributions is a requirement to be delivered not less frequently than once every 12 months. UNDP shall provide a format and assist the project team in categorizing, documenting and reporting on lessons learned. To this end a percentage of project resources will need to be allocated for these activities.

#### **Indicative Monitoring and Evaluation Work Plan and Corresponding Budget**

194. At the preparation IW, a detailed M&E plan will be developed and approved which will specify arrangements for M&E of each of the indicators at the level of objectives, outcomes, and outputs listed in the logical framework matrix. However, the following table provides the outline of the M&E framework.

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding project team Staff time</i>	Time frame
Inception Workshop	<ul style="list-style-type: none"> <li>▪ Project Coordinator</li> <li>▪ UNDP CO</li> <li>▪ UNDP GEF</li> </ul>	\$80,000	Within first two months of project start up
Inception Report	<ul style="list-style-type: none"> <li>▪ Project Team</li> <li>▪ UNDP CO</li> </ul>	None	Immediately following Inception Workshop
Measurement of Means of Verification for Project Purpose Indicators	<ul style="list-style-type: none"> <li>▪ National Coordinators will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members</li> </ul>	To be finalized in Inception Phase and Workshop. Indicative cost \$30,000	Start, mid and end of project
Measurement of Means of Verification for Project Progress and Performance (measured on an annual basis)	<ul style="list-style-type: none"> <li>▪ Oversight by MoE</li> <li>▪ Measurements by field officers and local IAs</li> </ul>	To be determined as part of the Annual Work Plan's preparation. Indicative cost \$15,000	Annually prior to APR/PIR and to the definition of annual work plans
APR and PIR	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ UNDP-GEF</li> </ul>	None	Annually
TPR and TPR report	<ul style="list-style-type: none"> <li>▪ Government Counterparts</li> <li>▪ MoE</li> <li>▪ Executing Agency</li> </ul>	None	Every year, upon receipt of APR
National Steering Committee Meetings	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ National Coordinators</li> </ul>	None	Following Project Inception Workshop and subsequently at least once a year
Periodic status reports	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ National Coordinators</li> </ul>	5,000	To be determined by Project team and UNDP CO
Technical reports	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ Hired consultants as needed</li> </ul>	8,000	To be determined by Project Team and UNDP-CO
Mid-term External Evaluation	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ National Coordinators</li> <li>▪ External Consultants (i.e. evaluation team)</li> </ul>	15,000	At the mid-point of project implementation.
Final External Evaluation	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ National Coordinators</li> <li>▪ External Consultants (i.e. evaluation team)</li> </ul>	25,000	At the end of project implementation
Terminal Report	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ National Coordinators</li> <li>▪ External Consultant</li> </ul>	None	At least one month before the end of the project
Lessons learned	<ul style="list-style-type: none"> <li>▪ MoE</li> <li>▪ National Coordinators</li> </ul>	8,000	Yearly
Visits to field sites (UNDP staff travel costs to be charged to IA fees)	<ul style="list-style-type: none"> <li>▪ UNDP CO</li> <li>▪ MoE</li> <li>▪ Government representatives</li> </ul>	15,000 (average one visit per year)	Yearly
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		US\$ 110,000	

## **PART V: Legal Context**

195. This Project Document shall be the instrument referred to as such in Article I of the Standard Basic Assistance Agreement between the Government of Ecuador and the UNDP, signed by the parties on January 19, 2005. The host country implementing agency shall, for the purpose of the Standard Basic Assistance Agreement, refer to the government co-operating agency described in that Agreement.

196. The UNDP Resident Representative in Ecuador is authorized to effect in writing the following types of revision to this Project Document, provided that he/she has verified the agreement thereto by the UNDP-GEF Unit and is assured that the other signatories to the Project Document have no objection to the proposed changes:

- a) Revision of, or addition to, any of the annexes to the Project Document;
- b) Revisions which do not involve significant changes in the immediate objectives, outputs or activities of the project, but are caused by the rearrangement of the inputs already agreed to or by cost increases due to inflation;
- c) Mandatory annual revisions which re-phase the delivery of agreed project inputs or increased expert or other costs due to inflation or take into account agency expenditure flexibility; and
- d) Inclusion of additional annexes and attachments only as set out here in this Project Document

## **SECTION II: Strategic Results Framework and GEF**

### **Part I: Additionality Cost Analysis**

#### *Project background*

197. Ecuador faces multiple hazards and presents a wide range of vulnerabilities to climate change. The impact of recurrent ENSO events demonstrates the widespread effects of climate variations in the country. Ecuador has in the past suffered the impact of recurrent drought, periodic flooding and associated losses in productive sectors. The effects of climate change are expected to intensify these impacts over the coming years and decades.

198. As the distribution and availability of water resources will change over time, governance structures and water use practices will need to adapt. Much adaptation will be local and will occur spontaneously. However, deliberate and planned adaptation to climate change requires an iterative and multi-tiered approach that enables the adoption of sound development choices in the face of uncertainty. It also involves different sectors and levels of society.

199. Future public and private investment in productive uses of water, particularly in irrigation and urban water supply, in vulnerable areas will need to factor in changes in the reliability of rainfall and the availability of surface water. Incremental investments will be needed to increase water storage, introduce water-saving technology and protect settlements and productive assets from storm surges and floodwaters. Sturdy institutions are required to head-off the growing threats to water resources with the impeding effects of climate change.

### *Additional cost assessment*

#### **Baseline**

200. At present, the water sector in Ecuador is characterized by uncertain institutional coordination of policy makers, the absence of water resources strategies that take into account climate change risks, and limited stakeholder participation. In spite of on-going relevant initiatives, there is a lack of solid understanding of how climate change would impact water supply and demand. Thus many plans and programmes that affect water resources are being designed or implemented without considering the need to address climate change risks on neither water resources nor adaptation requirements in the water sector. Under this business-as-usual scenario, these on-going initiatives will continue to ignore the threats of climate change including variability in water availability. In turn, the viability of such plans and programmes will be compromised.

201. At the local level, water management practices do not take into account risks associated with climate change and variability, thus vulnerable population is not able to cope with the impacts of climate risk. Adaptation is reactive and occurs on an ad hoc basis, usually after extreme events generate significant impacts in productive systems and energy generation. Furthermore, adaptation interventions in Ecuador have been limited to assessments and general description of adaptation measures, which have not produced lessons that can be replicated in different scales. As a result, stakeholders and national institutions have not been able to learn from relevant experiences that can feed into national and local planning to address climate risks in the broader development context.

202. National capacity to address adaptation to climate change in the water sector is weak. On-going efforts to strengthen it are circumscribed to the Second National Communication, which covers generic adaptation issues but neither addresses the capacity needed for implementation of adaptation measures on the ground, nor the strengthening of institutional capacity to mainstream adaptation in the water sector.

203. At the local level, neither provincial authorities nor community-based organizations would be able to design and implement locally appropriate solutions to increase resilience against the impacts of climate change in the water sector. This would be because of a lack of training, and the absence of practical approaches from which local solutions could be adapted to facilitate the participation of local stakeholders to address climate change risks.

#### **GEF Alternative Scenario**

204. The project alternative scenario is a water resource sector in Ecuador where climate risks are mainstreamed into relevant plans and programs at the national level and in four provinces. Local stakeholders are informed about current climate vulnerability conditions and climate change risk factors, and incorporate this information into local policies and decisions. The project will provide a practical framework to guide the process of integrating water climate change risks and adaptation into relevant water management plans. The guidance will serve as a comprehensive and practical reference on how local water governance institutions can conduct the integration of climate change risks into ongoing strategies and plans more effectively.

205. The project will result in modified national policies that increase the flexibility and resilience of productive, specifically those affecting water resources availability and usage. At the national level, monitoring capacities for environmental changes linked to climate change there will be strengthened, which will provide the means to assess vulnerability to the impacts of climate change and to design appropriate

responses. Decision makers at all levels and the general public will be more aware of the impacts of climate change and options for increasing capacity to deal with those impacts in the water sector.

206. At the local level, provincial authorities and community-based organizations will have the capacity to integrate climate changes issues into local development planning, and will be able to design locally appropriate solutions to the impacts of climate change. They will have recourse to lessons learnt from demonstrations of adaptations affecting irrigation and hydro-power, and they will also have access to financing for pilot activities to implement local solutions. Agriculture activities in selected provinces and one hydro-power plant will be more resilient to the impacts of climate change, thus supporting sustainable economic development.

### **Systems Boundary**

207. The system boundary for the project will be represented by both the national and local level. At the national level the project will address water governance by incorporating climate risks consideration into water management and decision making process. At the local level, the system boundary will be represented by certain provinces which host key watersheds where adaptation measures to climate change can be applied to improve the governance and management of water resources in the face of climate change with the participation of provincial authorities and local communities. The provinces where the project applies adaptation pilot measures, are Los Rios, Manabi, Loja and Azuay (specifically in the watershed that feeds the Paute hydroelectric project). In these provinces, the project will address current institutional limitations, lack of access to timely and reliable information on climate related hazards and the need for bolstering local adaptive capacities.

### **Summary of Costs**

208. This project will apply a sliding-scale approach to co-financing, in keeping with the principles outlined in the GEF Council paper GEF/C.24/12 (October, 2004), which states that the SCCF will be available to finance the additional costs of achieving sustainable development imposed on vulnerable countries by the impacts of climate change. In particular, SCCF projects will address the challenges faced by developing country Parties as a result of the impacts of climate change. The need to adapt to the adverse impacts of climate change presents additional barriers to the achievement of a country's sustainable development goals. Activities to overcome some of these barriers may not generate global benefits, e.g. activities in the health sector.

209. The same paper also proposed that Proposals for SCCF funding be assessed pragmatically by adopting a presumptive co-financing sliding proportional scale. Drawing on past experience and practices, the sliding scale rules state that for projects requesting between US\$1 million and \$5m, the SCCF will finance up to one third of the total project costs.

210. The proposed financial plan meets this rule, with the total request from the SCCF amounting to \$3 million, and with \$6 million being contributed through co-financing. The division of these costs across Outcomes is shown in the matrix below.

## SECTION II: STRATEGIC RESULTS FRAMEWORK AND GEF INCREMENT

### *Additional Cost Matrix*

<b>Cost/Benefit</b>	<b>Baseline (B)</b>	<b>Alternative (A)</b>	<b>Project and Additional costs (A-B)</b>
<b>Benefits</b>			
	Distribution and availability of water will change over time with climate change, therefore governance structure and water use practices will need to adapt. But, deliberate and planned adaptation requires an interactive and multi-tiered approach that enables the adoption of sound development choices in the face of uncertainty. It also involves different sectors and levels of society.	The project seeks to ease the way to the formulation and implementation of a regulatory framework and an institutional design adapted to changing supply of water and increasing uncertainty related to a changing climate.	
<b>Costs</b>			
<b>Outcome 1: Climate change risk on the water sector integrated into key relevant plans and programs.</b>	\$1,200,000 Uncertain institutional coordination of policy makers, the absence of water resources strategy that take into account climate change risks, and limited stakeholder participation	\$2,400,000 Ongoing plans and programmes represent an opportunity to integrate climate change concerns into water management plans and strategies at different levels	\$1,200,000 of which: GEF: \$400,000 Co-financing: \$800,000
Output 1.1: Practical guidance on the integration of climate risks into relevant water management plans and programmes developed	\$500,000	\$100,000 (SCCF)	\$700,000 of which: GEF: \$300,000 Co-financing: \$400,000
Output 1.2: Relevant plans and programmes incorporate climate risks in the water sector	\$700,000	\$300,000 (SCCF)	\$500,000 of which: GEF: \$100,000 Co-financing: \$400,000



<b>Outcome 2: Strategies and measures that will facilitate adaptation to climate change impacts on water resources implemented at the local level.</b>	\$3,250,000 Provincial and local organizations lack experience in designing and implementing locally appropriate responses. Due to the lack of adequate knowledge on anticipatory measures to address specific climate related threats on water resources, and tools to build climate resilience and the means to put in place adaptation measures, local communities will be constrained in their abilities to implement strategic responses	\$10,000,000 Interventions at the local level. The success of adaptation policy and measures will be measured in terms of increased resilience to impending climate hazards.	\$6,750,000 of which: GEF: \$2,000,000 Co-financing: \$4,750,000
Output 2.1: Measures, technologies and practices to use water more efficiently at local level, introduced and implemented in pilot systems	\$2,000,000	\$1,300,000 (SCCF) (\$600,000- for pilot demonstration activity 1 (Ag) \$700,00 for pilot demonstration activity (2) Hydro	\$3,500,000 of which: GEF: \$1,300,000 Co-financing: \$2,500,000
Output 2.2: Information management systems reflecting climate change impacts on the water sector developed	\$1,250,000	\$700,000 (SCCF) for setting up information management	\$3,250,000 of which: GEF: \$700,000 Co-financing: \$2,250,000
<b>Outcome 3: Institutional and human capacity strengthened, and information/lessons learned disseminated</b>	\$500,000	\$1,550,000 All interventions supported by the project will generate lessons of relevance not only to Ecuador but also to other countries facing similar hazards.	\$1,050,000 of which: GEF: \$600,000 Co-financing: \$450,000
Output 3.1: Improved institutional and technical capacities to support the mainstreaming of climate risks and implementation of adaptation measures in the water sector	\$250,000	\$200,000 (SCCF)	\$400,000 of which: GEF: \$200,000 Co-financing: \$200,000
Output 3.2 Knowledge and lessons learned to support implementation of adaptation measures compiled and disseminated	\$125,000	\$250,000 (SCCF)	\$300,000 of which: GEF: \$250,000 Co-financing: \$50,000

Output 3.3: Guidance documents for GEF and MoE on climate change adaptation programming in the water resource sector	\$125,000	\$250,000 (SCCF)	\$350,000 of which: GEF: \$250,000 Co-financing: \$100,000
<b>Cost Totals</b>	<b>\$4,950,000</b>	<b>\$13,950,000</b>	<b>\$9,000,000 of which: GEF: \$3,000,000 Co-financing: \$6,000,000</b>

***Logical Framework Analysis***

<b>Result</b>	<b>Indicator</b>	<b>Baseline value</b>	<b>Target and benchmarks</b>	<b>Means of verification and frequency</b>	<b>Assumptions</b>
<p><b>Goal</b>  <b>Objective: To reduce vulnerability to climate change through effective water resource management.</b></p>	<p>Mainstream adaptation to climate change into water management practices in Ecuador.</p> <p>Number of references to vulnerability of the water sector to climate risks in policies, plans and projects address.</p>	<p>Baseline value: climate change risks in the water sector are not addressed in relevant policies, plans and projects both at the national and local level.</p>	<p>By the end of the project, national and regional relevant plans include climate change risk considerations for the water sector.</p>	<p>Surveys/interviews /plans</p>	
<p><b>Outcome 1: Climate change risk on the water sector integrated into key relevant plans and programs.</b></p>	<p>Number of reference to water climate change risks in relevant plans and programmes.</p>	<p>Relevant development and risk management plans do not address climate change risk in the water sector.</p>	<p>By the end of the project, climate change risks in the water sector are addressed in three national plans and at least two provincial development plans.</p>	<p>Revised plans.</p>	<p>Political will to review the plans is ensured and maintained throughout the life of the project.</p>
<p><i>Output 1.1: Practical guidance to integrate water climate risk into relevant plans and programmes, developed.</i></p>	<p>Number of plans and programmes that apply Guidelines.</p>	<p>No guidelines to mainstream water climate risk exist.</p>	<p>By the end of year 1, practical guidance to mainstream water climate risk has , made available to relevant stakeholders by the end of Year 1.</p>	<p>Documents</p>	<p>Relevant stakeholders adopt the guidelines.</p>
<p><i>Output 1.2: Relevant plans and programmes incorporate climate risks in the water sector</i></p>	<p>Number of plans that integrate Climate change risk issues related to water management.</p>	<p>Relevant development and risk management plans, both at the national and the local level, do not</p>	<p>By the end of the project, the National Water Management Plan, National Development Plan, National Risk Management Plan, and at least two Provincial /Risk</p>	<p>Revised plans</p>	<p>Political will to review the plans is ensured and maintained throughout the life of the project.</p>

		address climate change risk in the water sector.	management Plans include climate change risk and adaptation measures for the water sector.		
<b>Outcome 2: Strategies and measures that will facilitate adaptation to climate change impacts on water resources implemented at the local level.</b>	Number of adaptation measures implemented at the local level	Adaptation measures are ad hoc. No long term adaptation measures implemented.	By the end of the project, adaptation measures to address climate risks in the water sector have been adopted by local stakeholders.	Evaluation reports	Local stakeholders support the adoption of adaptation measures.
<i>Output 2.1: Measures, technologies and practices to improve the adaptive capacity of water resources management introduced and implemented in pilot systems.</i>	Number of communities undertaking adaptation measures	Adaptation measures are ad hoc. No long term adaptation measures implemented.	By the end of the project, at least 10 communities implementing adaptation measures-	Field Surveys	Selected pilot province is best placed to demonstrate the benefits of measures to adapt to climate change.
	Number of farmers adopting water saving measures	None	By the end of the project, at least 50% if farmers participating in the project apply water saving measures.	Field Surveys	
	Certainty of the inflow to the Paute hydroelectric project under a climate change scenario	Hydropaute's risk management plan does not include adaptation to climate change related to water availability.	By the end of the project, a revised risk management plan incorporates measures that address the impact of climate change in the water inflow to the Paute hydroelectric project.	Revised Hydropaute's risk management plan	
<i>Output 2.2:</i>	Number of	Climate	By the end of the project, a	Reports of CNRH,	INAMHI designates

<i>Information management systems reflecting climate change impacts on the water sector developed</i>	institutional agreements to improve climate information networks	information networks do not account for climate information data	climate network that includes climate change information is operational in at least two provinces	INAMHI, and field inspection	technical counterparts to support the hydro meteorological network.  Local governments contribute to the implementation of the monitoring network  Basic hydro meteorological data is compiled in a regular basis.
<b>Outcome 3: Institutional and human capacity strengthened, and information/lessons learned disseminated</b>	Number of staff trained.  Number of awareness campaigns implemented	None	At least 300 personnel from relevant institutions in selected provinces are trained.	Training reports	
<i>Output 3.1: Improved institutional and technical capacities to support the mainstreaming of climate risks and implementation of adaptation measures in the water sector</i>	Number of staff trained.	Only specialized staff in the MoE has some knowledge of adaptation measures.	By the end of the project, 300 staff and small farmers will have been trained on issues related to incorporation of climate risks in the water sector into the relevant plans, implementation of adaptation intervention on the ground; and on the measurements of impacts of adaptation interventions	Evaluation reports	
<i>Output 3.2 Knowledge</i>	Number of lessons	No web site exists	Within 6 months of the start of	Website	Local stakeholders

<i>and lessons learned to support implementation of adaptation measures compiled and disseminated</i>	learned systematized	No lessons learned compiled	implementation, a publicly accessible web site will be created. At the time of project completion, at least 3 examples of lessons learned have been compiled and disseminated.		implement adaptation measures on the ground.
<i>Output 3.3: Guidance documents for GEF and MoE on climate change adaptation programming in the water resource sector provided</i>	Number of cases included in the ALM	No cases of best practices recorded	At the time of project completion, at least 3 examples of best practice generated through the project will be accessible through the ALM.  At the time of project completion, draft documents will be prepared to guide future GEF and MoE support for interventions on adaptation to climate change including variability	Documents	ALM becomes operational and effective in time to document best practices from the project  GEF and MoE continue to target adaptation to climate change including variability in the water resource sector

## Annexes

### **Annex 1: Evolution of National Institutions and their Mandates into Water Resources**

<b>Name of the institution</b>	<b>Main responsibility</b>	<b>Year of creation</b>	<b>Year of elimination</b>	<b>Comment</b>
National Irrigation Chamber (Caja Nacional de Riego)	Design, build and operate public irrigation systems	1944	1966	
Ecuadorian Institute of Water Resources (INERHI)	Those of the Caja Nacional de Riego + flood management infrastructure + evaluation, management, protection of water resources	1966 Merging of the Caja Nacional de Riego with the Undersecretary of Irrigation, Ministry of Agriculture	1994	In practice, continued centred in building irrigation systems
National Council of Water Resources (CNRH)	Created after the elimination of the INERHI. Should elaborate a National Water Resources Plan, regulate the use of water in governmental projects, the management of irrigation systems and its transfer to users, water quality control and the management of watersheds; establish cost recovery policies.	Since 1994		The Technical Secretariat is hosted by the Ministry of Agriculture. Considerations about the protection of sources and water quality are given little importance. Understaffed, under financed.
Regional Development Corporations	Design, build and operate water and flood control infrastructure in different regions of the country	1966 and 1994		
Ministry of Agriculture	Should develop irrigation infrastructure, give technical support to peasants.			In practice does not act, relying in CNRH. Irrigation infrastructure built during the last 30 years (worth approximately 30 million USD) is neglected.
National Institute of Meteorology and Hydrology (INAMHI)	Meteorological monitoring, monitoring of water flow in watersheds, monitoring of sea level.	Since 1970		Depends on the Ministry of Energy and Mines. Has lost an important fraction of monitoring equipment, understaffed.
Ecuadorian Institute of Sanitary Works (IEOS)	Water for human consumption and sanitation – policies and building of sanitary systems and distribution networks	1970	1992	
Undersecretary of Sanitation, Ministry of Urban Development and Housing (MIDUVI)	Created after the elimination of IEOS. Policy formulation.	Since 1992		
Municipalities	The building and operation of wastewater systems and drinking water treatment and distribution networks	1992		In practice, few municipalities have the capacity to fulfil these responsibilities. Only one

	were transferred to municipalities after the elimination of IEOS.			municipality treats wastewater.
Ecuadorian Institute for Electrification (INECEL)	Elaborating a national electrification strategy, generating, transmitting and distributing energy	1962	1996	Executed hydro power projects without paying attention to the management of water resources. Dissolved in order to allow for the participation of private investors in energy generation, transmission and distribution.
National Electrification Council (CONELEC)	Regulation of energy generation, fixation of tariffs, environmental permits for generation and transmission projects.	Since 1996		
Ministry of the Environment	Forms part of the Board of CNRH, management of protected areas (which host important watersheds)	Since 1996		No concrete responsibilities in the management of water resources.
Other institutions: Undersecretary of fishing (Ministry of Industries and Commerce), Merchant Navy Direction (DIGMER, in the Ministry of Defence), etc...	Other uses of water: fishing, aquaculture, tourism and recreation, navigation			

Source: GWP, 2003



## Annex 2: Roles, Responsibilities and Contact Details of Key Stakeholders

Institution	Contact person	Contact details	Main responsibility	Role in Project
National Climate Change Committee (CNC)	Ing. Roberto Urquizo Subsecretario de calidad ambiental	Av. Eloy Alfaro y Amazonas, Edificio MAG 7mo. Piso. Quito Phone: 593-2 256-3423 593-2 256-3291 ext. 144	Collegiate body composed of representatives from several Ministries (Environment -permanent president - Energy and Mines, Foreign Affairs) as well as, private sector - represented by the Production Chambers-, the National Council for University Education (CONESUP), the Ecuadorian Committee for the Nature and Environment (CEDENMA) - an umbrella NGO entity - and the INAMHI - secretary of the CNC - The Committee operates through technical multi-sectoral Working Groups; which are led by public entities. For example, CNRH - Water Resources and CC, Ministry of Energy and Mines - Energy and CC .	Be a key political project counterpart for supporting the mainstreaming climate change criteria through national institutions.
Ministry of the Environment (MoE)	Ing. Roberto Urquizo Subsecretario de calidad ambiental	Av. Eloy Alfaro y Amazonas, Edificio MAG 7mo. Piso. Quito Phone: 593-2 256-3423 593-2 256-3291 ext. 144	National Environment Authority, management of protected areas (which host important watersheds) Forms part of the Board of CNRH. Lead the CNC.	It presides the National Steering Committee for this project. It is the GEF operational focal point. Will collaborate in result #2, Public awareness campaign increasing support for adaptation measures. Policy development and enforcement.
National Council of Water Resources (CNRH)	Ing. Víctor Mendoza Secretario General	Av. Eloy Alfaro y Amazonas, Edificio MAG 3er. Piso. Quito Phone: 593-2 255-4255 593-2 255-4376	National Authority of Water in Ecuador. Should elaborate a National Water Resources Plan, regulate the use of water in governmental projects, the management of irrigation systems and its transfer to users, water quality control and the management of watersheds; establish cost recovery policies. Part of the CNC; be in charge of the Working Group on water resources	As National Authority, CNRH will be responsible for the completion of outcome 1 and will form part of the National Steering Committee of the project. Be responsible for the result #1: Improved systemic capacity supports effective water management under conditions of climate change. Policy development and enforcement.

			and CC.	
National Secretary of Planning and Development (SENPLADES)	Ec. Blanca Fiallos	Benalcázar 679 y Chile. Edif. La Unión 4to. Piso Quito Phone: 593-2 258-0737 593-2 295-1213	In charge of planning and managements of strategies for the development of the country. Formulate of sectoral risk management projects.	Key partner to introduce the climate change issue into the National Agenda, considering the opportunity of the new government arrangements. Technical expertise in risks and planning.
National Institute of Meteorology and Hydrology (INAMHI)	Dr. Laureano Andrade Director ejecutivo	Iñaquito 700 (N36-14) y Corea. Quito Apartado 16-310 <a href="http://inamhi.gov.ec">http://inamhi.gov.ec</a> Phone 593-2 243-6910	Meteorological monitoring, monitoring of water flow in watersheds INAMHI has a secretarial role in the CNC; has lost an important fraction of monitoring equipment, understaffed	Key role in climate data and observation, early warning system. It will be useful to work with these institutions to obtain good results in the output #2, information management system that meets stakeholder's needs.
Navy's Oceanographic Institute (INOCAR)	Capitán de Fragata de Estado Mayor Mario Proaño Silva	Av. 25 de Julio Vía Puerto Marítimo, Base Naval Sur phone: (593-4) 2481300 Fax: (593-4) 2485166 Guayaquil – Ecuador	Monitoring of sea level, marine currents and related issues.	Key role in climate data and observation, early warning system. It will be useful to work with these institutions to obtain good results in the output #2, information management system that meets stakeholder's needs.
International Center for Research en the El Niño Phenomenom (CIIFEN).	Rodney Martínez Güingla Oceanógrafo Coordinador Científico	Escobedo y 9 de Octubre 1204 phone: (593) 4 2 514770 Fax: (593) 4 2 514771 Web site: <a href="http://www.ciifen-int.org">www.ciifen-int.org</a> Guayaquil - Ecuador	Monitoring of ENSO and related issues	
The Consortium for Provincial Councils of Ecuador (CONCOPE)	Gustavo Abdo / Raúl Egas	La Pinta E6-14 y Rábida 2do. Piso. Quito Phone: 593-2 223-0475	Group all the provincial councils of Ecuador.	Facilitate the approach to provincial councils in which the project will be working.
The Association of Municipalities of Ecuador (AME)	Lorens Olsen Pons Presidente Dr. Guillermo Tapia Secretario General	Agustin Guerrero E5-24 y Jose Maria Ayora Quito-Ecuador Phone: 593-2 246-9796 593-2 227-4949	Federates all the municipal government of Ecuador. Building and operation of wastewater systems and drinking water treatment and distribution	Facilitate the approach to municipal government in which the project will be working.

		<a href="http://www.ame.gov.ec">www.ame.gov.ec</a>	networks.	
The Water Resources Forum (FRH)	Aline Arroyo Castillo Coordinadora  Antonio Gaybor Secretario Ejecutivo	Av. Eloy Alfaro y Amazonas, Edificio MAG 7mo. Piso. Quito Phone: 593-2 256-3419 593-2 256-3485	This Forum has become an important public arena for discussions on water policies	A water users association, represents the views of the small consumers, peasants and NGOs Technical secretariat CAMAREN
Regional Development Corporations (CDR's)			Created at the same time than CNRH. In charge of design, build and operate water and flood control infrastructure in different regions of the country.	If this project decides to work in a specific region, it would help to coordinate with the corresponding CDR, in order to do not duplicate efforts. It would be possible to mainstreaming the climate change criteria into their projects.
National Electrification Council (CONELEC)	Patricio Oliva	Av. Naciones Unidas E7-71 y Av. De los Shyris Edificio CONELEC Quito Phone: 593-2 244-0123 593-2 226-8738	Regulation of energy generation, fixation of tariffs, environmental permits for generation and transmission projects.	The project plans to work with hydro energy tasks, so we could coordinate with CONELEC in order to take into account climate change criteria into their approvals for hydro energy projects.

**Draft Budget (To be updated including using the new TBWP at CEO endorsement)**

<b>PIMS No: 3520</b>								
<b>Project Title: Adaptation to Climate Change through Effective Water Governance in Ecuador</b>								
<b>GEF Outcome/Atlas Activity</b>	<b>Responsible Party</b>	<b>Source Funds</b>	<b>of</b>	<b>Amount (USD) Year 1</b>	<b>Amount (USD) Year 2</b>	<b>Amount (USD) Year 3</b>	<b>Amount (USD) Year 4</b>	<b>Total (USD)</b>
OUTCOME 1: Climate change risks of the water sectors integrated into the key plans and programmes	Project Management Unit	GEF		100,000	150,000	100,000	50,000	400,000
		Government		250,000	250,000	150,000	150,000	800,000
		<i>Sub-total</i>		<i>350,000</i>	<i>400,000</i>	<i>250,000</i>	<i>200,000</i>	<i>1,200,000</i>
OUTCOME 2: Strategies and measures that will facilitate adaptation to climate change impacts on water resources implemented at local level	Project Management Unit	GEF		300,000	600,000	700,000	400,000	2,000,000
		Government		1,750,000	1,000,000	1,500,000	500,000	4,750,000
		<i>Sub-total</i>		<i>2,050,000</i>	<i>1,600,000</i>	<i>2,200,000</i>	<i>900,000</i>	<i>6,750,000</i>
OUTCOME 3: Institutional and human capacity strengthened and information-lessons learned disseminated	Project Management Unit	GEF		100,000	200,000	200,000	100,000	600,000
		Government		50,000	200,000	150,000	50,000	450,000
		<i>Sub-total</i>		<i>150,000</i>	<i>400,000</i>	<i>350,000</i>	<i>150,000</i>	<i>1,050,000</i>
<i>Sub-total</i>		<i>GEF</i>		<i>500,000</i>	<i>950,000</i>	<i>1,000,000</i>	<i>550,000</i>	<i>3,000,000</i>
		<i>Government</i>		<i>2,050,000</i>	<i>1,450,000</i>	<i>1,800,000</i>	<i>700,000</i>	<i>6,000,000</i>
<b>TOTAL</b>				<b>2,550,000</b>	<b>2,400,000</b>	<b>2,800,000</b>	<b>1,250,000</b>	<b>9,000,000</b>

### Annex 3: UNDP Monitoring and Evaluation Framework for Adaptation

**Table 2: Adaptation Goals, Objectives and Indicative Outcomes and Indicators for each TA**

(Acronyms: VRA - vulnerability reduction assessment; QBS - questionnaire based surveys; EWS - early warning systems)

<i>TA2. Water Resources and Quality</i>			
<b>GOAL:</b> Water stress and scarcity of clean water resulting from climate change reduced/minimized.			
<b>cf. MDG Goal 7, Target 10:</b> Halve, by 2015, the proportion of people without sustainable access to safe drinking water			
<ol style="list-style-type: none"> <li>1. Exposure: Development of areas projected to experience high water stress minimized.</li> <li>2. Vulnerability: Vulnerability to water stress and/or scarcity of clean water reduced.</li> <li>3. Adaptive Capacity: Institutional capacity of water sector including supply and demand management to respond to long-term climate variability and change enhanced.</li> </ol>	<ol style="list-style-type: none"> <li>1. Proportion of population classed as water stressed relative to projected baseline without adaptation interventions.</li> <li>2. Number of water-related emergencies declared or instances of temporary water rationing, normalised with respect to inter-annual variations in key climatic variables.</li> <li>2.1 VRA based on interviews with members of vulnerable communities.</li> <li>3. (or 2.2) Water saving capacity for managing supply during times of stress</li> <li>3.1 QBS based on information gathered from key stakeholders</li> </ol>	<ol style="list-style-type: none"> <li>1. Development plans/specifications informed by or revised to account for potential impact of climate change on future water resources.</li> <li>2. (or 3) Water saving measures (e.g. rainwater harvesting, micro dams, efficient technologies) introduced</li> <li>3. (or 4) Demand side management measures piloted, e.g. targeted pricing to reduce wastage.</li> <li>3.1 Generation and dissemination of information on climate change and impacts and water resources generated and disseminated among water planners.</li> <li>4. New plans and policies based on plausible climate change impacts on water availability and use developed and piloted.</li> </ol>	<ul style="list-style-type: none"> <li>• QBS on extent to which development of water-sensitive sectors include considerations of CC.</li> <li>• Number of households, communities implementing water saving measures</li> <li>• Additional available freshwater per capita/ household resulting from these measures, against projected baseline.</li> <li>• Success of pilots (QBS), water saved as a result.</li> </ul>

## Annex 4: UNDP Template for lessons learned in adaptation projects

Completed by:

Date:

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### Project Data

Name of the project:

PIMS:

#### Motives – engaging stakeholders

1. What development challenge(s) motivated this project?

2. What climate-related challenge(s) motivated this project?

#### Baseline activities and additionality

3. What were the successes and challenges of building on baseline development to design the project?  
What makes the activities funded by the project “additional” (attributable to climate change)?

#### Inputs/Gaps in resources for project development

4. What were the most useful sources of climate change and other information utilized in project design?  
What information gaps arose?

5. How useful was Adaptation Programming Website in developing the project and how could it be improved?

Factors for success/failure

6. What key factors hindered timely progress in project development, and what key factors enabled success? (E.g. methods, policies, capacities, etc.)

Methods: Project problem analysis

7. Describe the challenges and benefits of the methodologies used for problem analysis, e.g. for baseline assessment; APF approaches; use of GCMs or climate observations; outcomes or processes from assessments (NAPAs, NCs), etc.

Methods: Assessment of adaptation response

8. Describe the challenges and benefits of the methodology used for identification and selection of adaptation responses (e.g. assessment of current coping/adaptation; assessment of maladaptation; cost-benefit analysis; multi-criteria analysis, etc.)

Other Adaptation priorities identified

9. What key systems or areas were identified as priorities for adaptation during project development that will **NOT** be addressed by the project?

Overall

10. Recommendations for future adaptation project developers.

- 1.
- 2.
- 3.



## Annex 5: References to Climate Change in the Ecuadorian Written Media, 2001-2007

### References related to the Paute Hydroelectric Project

- La generación bajó en la Central Paute por la sequía [martes, 16 de Enero del 2007]
- País: Paute genera el 50% de la demanda [jueves, 28 de Diciembre del 2006]
- Las lluvias llegan a Paute y los apagones se descartan [viernes, 17 de Noviembre del 2006]
- Paute al ritmo de la lluvia [sábado, 18 de Noviembre del 2006]
- El caudal en Paute subió por las lluvias en Cuenca [jueves, 16 de Noviembre del 2006]
- La hidroeléctrica de Paute cubre el 55 por ciento de la demanda [jueves, 16 de Noviembre del 2006]
- El subsidio eléctrico al diésel es de USD 123,3 millones [lunes, 13 de Noviembre del 2006]
- Gobierno descartó apagones por sequía en Paute [domingo, 12 de Noviembre del 2006]
- Cota de Paute se ubicó a siete metros del límite mínimo para que pueda operar [7 Nov del 2006]
- La compra de energía a Perú está financiada en un 50% [martes, 7 de Noviembre del 2006]
- Cenace advierte sobre peligro de apagones en quince días [lunes, 6 de Noviembre del 2006]
- Menos energía llega de Colombia [viernes, 3 de Noviembre del 2006]
- Energía espera contar con 395 megavatios para enfrentar la crisis eléctrica en noviembre [1 Nov 2006]
- El ahorro de energía eléctrica se cumple a medias en la capital [sábado, 28 de Octubre del 2006]
- Conelec: si el nivel de la cota de Paute baja a 1 975 metros empezarán los racionamientos [ 27 Oct 2006]
- El Gobierno restringe el uso de energía eléctrica [jueves, 26 de Octubre del 2006]
- Paute no logra recuperar su caudal [lunes, 9 de Octubre del 2006]
- La generación de energía en bajada [miércoles, 4 de Octubre del 2006]
- Las reservas de agua en la Hidroeléctrica Paute se recuperan [martes, 22 de Agosto del 2006]
- El caudal de la Central Hidroeléctrica de Paute a la baja [miércoles, 16 de Agosto del 2006]
- El caudal de Paute se mantiene en niveles bajos [miércoles, 16 de Agosto del 2006]
- La conexión eléctrica con Colombia se reanudó desde ayer [martes, 15 de Agosto del 2006]
- La campaña de ahorro de energía no surte efecto, según el Gobierno [lunes, 14 de Agosto del 2006]
- 'La emergencia en lo eléctrico debe seguir' [domingo, 13 de Agosto del 2006]
- Leve recuperación en la Central de Paute [domingo, 13 de Agosto del 2006]
- Ecuador importará electricidad de Perú [miércoles, 9 de Agosto del 2006]
- Energía: la crisis se agrava [miércoles, 9 de Agosto del 2006]
- Paute mejora su caudal y se descartan apagones al momento [miércoles, 9 de Agosto del 2006]
- Paute opera al 30 por ciento [miércoles, 9 de Agosto del 2006]
- El nivel en Paute no mejora [miércoles, 9 de Agosto del 2006]
- En agosto no habrá apagones [miércoles, 9 de Agosto del 2006]
- Atentados en Colombia podrían dejar a oscuras a Ecuador [lunes, 7 de Agosto del 2006]
- Ecuador importará electricidad de Perú [domingo, 6 de Agosto del 2006]
- La grave crisis eléctrica *Por Editorial Diario El Comercio* [sábado, 5 de Agosto del 2006]
- Paute opera al 30 por ciento [viernes, 4 de Agosto del 2006]
- Perú y las barcasas de Keppel reforzarán las reservas [viernes, 4 de Agosto del 2006]
- Palacio no irá a Bolivia debido a emergencia eléctrica [viernes, 4 de Agosto del 2006]
- Ecuador busca la energía del Perú [jueves, 3 de Agosto del 2006]
- Empresa eléctrica ordenó hoy racionamiento de energía para escenarios deportivos en Quito [3 Agosto 2006]
- Energía: la crisis se agrava [miércoles, 2 de Agosto del 2006]
- Paute mejora su caudal y se descartan apagones al momento [miércoles, 2 de Agosto del 2006]

- Paute opera al 30% de su capacidad [martes, 1 de Agosto del 2006]
- La importación de energía se restringió [viernes, 28 de Julio del 2006]
- El caudal baja en Paute y Eercs ahorra energía [martes, 27 de Junio del 2006]
- Las lluvias mejoran el nivel del embalse en la Central Paute [martes, 30 de Mayo del 2006]
- Riesgo de apagones por reducción de caudal de Paute [jueves, 25 de Mayo del 2006]
- Alerta por los caudales en Paute [jueves, 25 de Mayo del 2006]
- La lluvia afecta a más cantones [viernes, 24 de Marzo del 2006]
- ¡Urgente!: electricidad [viernes, 10 de Marzo del 2006]
- El estiaje se aleja de la Central Paute [sábado, 11 de Febrero del 2006]
- Falta de transparencia eléctrica [viernes, 30 de Diciembre del 2005]
- Las lluvias pasan la factura a las vías [miércoles, 28 de Diciembre del 2005]
- Las lluvias alejan el fantasma de los apagones [lunes, 26 de Diciembre del 2005]
- El estiaje persiste pese a las lluvias en Azuay [domingo, 4 de Diciembre del 2005]
- Paute: la época más seca se inició [viernes, 2 de Diciembre del 2005]
- Paute trabaja a un 40% de su capacidad [lunes, 28 de Noviembre del 2005]
- El consumo de energía crece y el suministro tambalea [jueves, 24 de Noviembre del 2005]
- La Central Hidroeléctrica Paute enfrenta su peor caudal [viernes, 7 de Octubre del 2005]
- Paute: a 12 m de su nivel más crítico [jueves, 6 de Octubre del 2005]
- Todos los ojos están en Paute [sábado, 1 de Octubre del 2005]
- La generación eléctrica en el país puede llegar a cero [viernes, 30 de Septiembre del 2005]
- Apagones, ¿otra vez? [viernes, 23 de Septiembre del 2005]
- Una ciudad sin agua, un país sin luz [domingo, 18 de Septiembre del 2005]
- Las barcas cubren el aumento de la demanda [sábado, 17 de Septiembre del 2005]
- Paute: julio y agosto entre los más secos en 41 años *9/16/2005*
- Podrían haber cortes de energía: Alejandro Ribadeneira [martes, 13 de Septiembre del 2005]
- 2 barcas para evitar los efectos del estiaje *8/27/2005*
- 95 millones financian la emergencia eléctrica *9/1/2004*
- El Gobierno declarará la emergencia eléctrica *8/31/2004*
- Cenace advierte sobre el peligro de apagones *8/22/2004*
- Paute volvió a generar el 65% de la demanda *4/29/2004*
- Los niveles de agua mejoran en Paute *2/7/2004*
- La sequía no afectará el suministro de arroz *2/1/2004*
- La Central Paute se ubica a tres metros menos de su nivel óptimo *9/30/2003*
- La Central Hidroeléctrica Paute a nueve metros de su nivel óptimo *8/28/2003*
- Tres escenarios para el sector eléctrico frente al estiaje *8/4/2003*
- Ecuador ya compra luz a Colombia *3/2/2003*
- Más diésel importado para dar luz *9/25/2002*
- Paute baja la producción de energía *9/19/2002*
- Energía: las previsiones por el estiaje empiezan *7/27/2002*
- Noboa prolonga estado de emergencia eléctrica *1/10/2002*
- Apagones: cae más agua en Paute, pero sigue la alerta *11/9/2001*
- La generación eléctrica, en etapa crítica *11/6/2001*
- La central Paute tiene menos agua *11/5/2001*
- Eléctricas: el 31% no funciona *11/2/2001*

- Embalse en Paute, en niveles bajos; las generadoras no se estabilizan *10/29/2001*
- El clima puso en aprietos a la producción *10/27/2001*
- Energía y producción *10/26/2001*
- El sector eléctrico en la m... *10/19/2001*
- El bombardeo de nubes empezó en el Austro *10/18/2001*
- Paute: a cuidar el embalse *10/14/2001*
- El fantasma del apagón *10/12/2001*
- Luz: se actúa sobre una crisis dada *10/11/2001*
- Paute: el caudal bajó a 62,50 *10/10/2001*
- Apagones se posponen... por ahora *10/8/2001*
- Horarios de los apagones se definirán mañana *10/7/2001*
- Los apagones, fruto de la negligencia *10/7/2001*
- El agua en Paute continúa bajando *10/6/2001*
- Apagones desde el jueves *10/5/2001*
- El sector eléctrico en emergencia *10/5/2001*
- El caudal de Amaluza baja *10/4/2001*

### **References to Climate Change in General, 2001-2007**

- Y sin embargo, se calienta... *1/17/2007*
- Más reservorios para enfrentar las sequías [sábado, 10 de Junio del 2006]
- Más de 5 000 familias de Manabí son afectadas por las lluvias [viernes, 24 de Marzo del 2006]
- Derrumbes y retrasos en los vuelos por las lluvias [martes, 14 de Marzo del 2006]
- Más de 5 000 familias de Manabí son afectadas por las lluvias [martes, 14 de Marzo del 2006]
- La alianza local es la clave para prevenir un desastre [lunes, 13 de Marzo del 2006]
- Las lluvias bajaron de nivel en el Litoral [domingo, 12 de Marzo del 2006]
- La sequía se extiende en el país y la Amazonia [lunes, 14 de Noviembre del 2005]
- El fantasma de la sequía crece [domingo, 6 de Noviembre del 2005]
- Ecuador registra su verano más largo en 40 años [martes, 20 de Septiembre del 2005]
- Los caudales se redujeron en ocho cuencas [viernes, 23 de Febrero del 2007]
- El Niño se ‘estanca’ en las costas del Ecuador [jueves, 22 de Febrero del 2007]
- La Defensa Civil de Los Ríos busca apoyo en las alcaldías y Prefectura [lunes, 12 de Febrero del 2007]
- La temperatura de Ecuador experimentó un cambio [jueves, 8 de Febrero del 2007]
- Chone todavía no está lista para enfrentar un invierno moderado [jueves, 8 de Febrero del 2007]
- El alcantarillado mejora en Quinindé por el invierno [jueves, 8 de Febrero del 2007]
- Las lluvias causan problemas en las zonas pobres de Guayaquil [martes, 6 de Febrero del 2007]
- USD 20 millones cuesta el saneamiento ambiental [lunes, 5 de Febrero del 2007]
- Los protocolos de riesgo deben mejorarse’ [domingo, 4 de Febrero del 2007]
- El arreglo de las tuberías en Nueva Loja afectó a los locales [sábado, 3 de Febrero del 2007]
- Más prevención en Iñaquito [sábado, 3 de Febrero del 2007]
- Tras dos meses de espera, el dragado del Coca empezó [viernes, 2 de Febrero del 2007]
- Más precipitaciones caerán en la Sierra centro [martes, 30 de Enero del 2007]
- La limpieza de canales en Machala tiene avances [martes, 23 de Enero del 2007]
- Los Ríos ejecuta un plan contra las enfermedades tropicales [sábado, 20 de Enero del 2007]
- Las lluvias ponen el caos en la periferia de Guayaquil [viernes, 19 de Enero del 2007]

- El permiso para dragar al río Coca no se entrega [martes, 16 de Enero del 2007]
- Babahoyo sintió la fuerza del inicio del invierno [jueves, 11 de Enero del 2007]
- Las primeras lluvias afectan a poblaciones del Litoral [jueves, 11 de Enero del 2007]
- El Ecuador soporta altas temperaturas [miércoles, 10 de Enero del 2007]
- El dragado del río Coca todavía no empieza [lunes, 8 de Enero del 2007]
- Lluvias: 1 600 familias de El Oro, en riesgo [viernes, 5 de Enero del 2007]
- El suburbio de Quevedo, sin obras básicas [jueves, 4 de Enero del 2007]
- Las lluvias en Esmeraldas ponen en riesgo a las casas de caña y cinc [jueves, 4 de Enero del 2007]
- 45 casas de La Victoria, abandonadas [lunes, 1 de Enero del 2007]
- Rocafuerte es un cantón con riesgo por las inundaciones [jueves, 28 de Diciembre del 2006]
- El Niño pondrá en peligro a 910 000 ha en 10 provincias [miércoles, 27 de Diciembre del 2006]
- El río Jubones aumentó su caudal [miércoles, 27 de Diciembre del 2006]
- Las 5 paralizaciones de Rioverde buscan la entrega de recursos [miércoles, 27 de Diciembre del 2006]
- 'El fenómeno El Niño será de una intensidad media' [viernes, 22 de Diciembre del 2006]
- La lluvia de ayer inundó una gran parte de Ibarra [viernes, 22 de Diciembre del 2006]
- Todavía no hay recursos para mitigar a El Niño [miércoles, 20 de Diciembre del 2006]
- Corea del Sur dona fondos a San Lorenzo [lunes, 18 de Diciembre del 2006]
- El Riesgo preocupa en Imbabura [jueves, 14 de Diciembre del 2006]
- Las familias de la Amazonia padecen las inundaciones [lunes, 11 de Diciembre del 2006]
- Un sector de Ibarra, en emergencia por las lluvias [sábado, 9 de Diciembre del 2006]
- La prevención por las lluvias no llega a los sitios críticos de Loja [viernes, 8 de Diciembre del 2006]
- La lluvia del miércoles anegó la calle Alemania y la av. Orellana [viernes, 8 de Diciembre del 2006]
- La Armada presentó el plan de dragado para el río Coca [miércoles, 6 de Diciembre del 2006]
- Río Verde, sin implementos para enfrentar el invierno [miércoles, 6 de Diciembre del 2006]
- Los Ríos, sin obras de prevención [viernes, 1 de Diciembre del 2006]
- En Quevedo empezó la limpieza de alcantarillas [lunes, 27 de Noviembre del 2006]
- Las lluvias mueven las obras [sábado, 25 de Noviembre del 2006]
- 15 familias corren riesgo por las lluvias [viernes, 24 de Noviembre del 2006]
- El Oro y Manabí trabajan en obras para afrontar El Niño [miércoles, 22 de Noviembre del 2006]
- El Niño pone en alerta al área rural de La Maná [martes, 21 de Noviembre del 2006]
- La intensidad de lluvias es mayor en la zona norte [viernes, 17 de Noviembre del 2006]
- Las lluvias llegan a Paute y los apagones se descartan [viernes, 17 de Noviembre del 2006]
- Gobierno descartó apagones por sequía en Paute [domingo, 12 de Noviembre del 2006]
- 60 familias esmeraldeñas deben dejar sus talleres [lunes, 13 de Noviembre del 2006]
- El agua potable urge en los barrios de Pedernales [viernes, 10 de Noviembre del 2006]
- Los Ríos exige ayuda para enfrentar a El Niño [miércoles, 8 de Noviembre del 2006]
- 10 entidades trabajan para evitar inundaciones [miércoles, 8 de Noviembre del 2006]
- Lucha de los Pobres se alista para el invierno [miércoles, 8 de Noviembre del 2006]
- Quevedo ejecuta acciones para mitigar los efectos del invierno [lunes, 30 de Octubre del 2006]
- Las lluvias en la Costa llegarían los primeros días de diciembre [sábado, 28 de Octubre del 2006]
- Preocupación binacional por el canal de Huaquillas [miércoles, 25 de Octubre del 2006]
- Inversión en reservorios y sistemas de regadío [sábado, 7 de Octubre del 2006]
- La amenaza de El Niño mueve al comité local de prevención [jueves, 21 de Septiembre del 2006]
- Lluvias ligeras se prevén para el Litoral [jueves, 21 de Septiembre del 2006]

- Latinoamérica espera llegada de fenómeno “El Niño” [jueves, 21 de Septiembre del 2006]
- Guayas, Manabí y Los Ríos sufren sequía [martes, 27 de febrero del 2007]
- Puerto López tiene escasez de agua [martes, 2 de enero del 2007]
- Rocafuerte es un cantón con riesgo por las inundaciones [jueves, 28 de diciembre del 2006]
- Heladas y sequía dejan daños por \$20 millones [Martes 6 de diciembre de 2005]
- La sequía en la Costa daña 100 mil hectáreas [Febrero 27, 2007]
- Hambre y sequía por calor global[Enero 31, 2007]
- Dengue y otros efectos del invierno son la crónica de una muerte anunciada[10 de abril de 2006]
- El calentamiento causa la migración de pingüinos [jueves, 8 de febrero del 2007]

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