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"Analysis of Social and Economic Impact in the Project of construction for The Cañar River Flood Control, financed by the company China International Water & Electric Corp - CWE"

**Graduate Thesis prior obtaining a
Bilingual Bachelor in International Studies minor Foreign Trade**

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DEDICATION

I dedicate this thesis to the human beings I love most, my parents, Fernando and Lourdes, for being that unconditional support at all times, and for being the source of inspiration and motivation to develop and overcome myself every day, for giving me the understanding and strength that with effort and dedication you can all and everything can be reached.

Gustavo Donoso

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ABSTRACT

The Cañar River Flood Control Project is part of the Bulubulu-Cañar-Naranjal system. In 2012, the SENAGUA, under bilateral agreements between the Governments of Ecuador and China, the company hired "China International Water & Electrical Corp. (CWE) for the construction of the project and the Consorcio Cañar, to supervise the project "Cañar River Flood Control". The project became in operations after 4 years of construction with different fronts of work.

The megaproject "Flood Control", consist on many engineering works implementation to control the periodic floods and stabilize the channels due to extreme river rainfall and the particular physiology of the zone, which allows, in turn a better usage of water resources and to generate higher profits. The work is located in the provinces of Guayas and Cañar in the lower basin southeast from the Guayas River.

This project involves an area of direct and indirect influence of approximately 40,560Ha benefiting a population of 50.126 habitants with a total cost of \$233'000,427.59. Each year, during the winter, the Cañar River leaves a number of flooded hectares and many affected families; according to the data obtained by SENAGUA, losses from flooding in these areas represent 25% of generated revenues in one year.

In 2008, the year where there have been major floods in the last decade, economic losses were more than \$86 million in the agricultural sector in the Buluca system region, so the flood control project will allow to the agricultural sector and the people who live and develops in the lower basin of Guayas, to be benefited and protected. This mega-project became operational on January of 2016 and we can see the first benefits in this year to the residents of the following sectors: La Troncal, Puerto Inca, Pancho Negro, Boliche, San Carlos, El Lechugal, San Martin, among others, ensuring their well-being during all year, because this situation in other circumstances without this project the region would be inundated.

RESUMEN EJECUTIVO

El proyecto de control de inundaciones del río Cañar, forma parte del sistema Bulubulu-Cañar-Naranjal, en el año 2012 la SENAGUA, en virtud de los convenios bilaterales entre los Gobiernos de Ecuador y China, contrata a la empresa “China International Water & Electrical Corp. (CWE) para la construcción del proyecto y al Consorcio Cañar, para fiscalizar el proyecto “Control de inundaciones del río Cañar”. En la actualidad el proyecto se encuentra en operaciones después de casi 4 años dedicados a su construcción, con diferentes frentes de trabajo.

El megaproyecto de Control de Inundaciones, consiste en la implementación de una serie de obras ingenieriles para controlar las inundaciones periódicas y estabilizar los cauces, debido a las precipitaciones fluviales extremas y a la fisiología particular de la zona, lo que permiten a su vez el mejor aprovechamiento de los recursos hídricos y la generación de mayores beneficios. La obra se encuentra ubicada en las provincias del Guayas y Cañar, en la cuenca baja al sureste del río Guayas.

Este proyecto involucra un área de influencia directa e indirecta de aproximadamente de 40,560Ha, beneficiando a una población de 50,126 habitantes y con un costo total de USD 233'000.427,59. Cada año en la época invernal el río Cañar deja un sin número de hectáreas inundadas y muchas familias damnificadas, según datos obtenidos por SENAGUA, se establece que las pérdidas por inundaciones en estas áreas representan un 25% de los ingresos generados en el año.

En el año 2008, año donde se ha producido una de las mayores inundaciones de la última década, las pérdidas económicas fueron de más de \$86 millones de dólares, en el sector agrícola en la región del sistema Buluca, por lo que el proyecto de control de inundaciones permitirá que el sector agrícola y los pobladores que viven y se desarrollan en la cuenca baja del Guayas se vean beneficiadas y protegidas. Este megaproyecto entró en funcionamiento en enero de 2016 y en lo que va del año ya se ven los primeros beneficios a los habitantes y sembríos de los sectores de: La Troncal, Puerto Inca, Pancho Negro, Boliche, San Carlos, El Lechugal, San Martín, entre otros, y garantizando su bienestar a lo largo de todo el año, que en otros años sin los mega proyectos estos sectores ya estuvieran inundados.

INTRODUCTION

Background

The lower basin of the Guayas River, an agriculturally rich area, is affected every year by the strong floods, generated by winter rains in the Ecuadorian coast, causing lost valued in 86 million dollars annually or a value representing the 25% of annual production. These hard blows, suffered by agriculture in this area, have always generated the concern of the current government, because their people have always clamored for help in one way or another to avoid overflow of rivers, but the concern of governments wasn't been a priority and was showed little impact acts.

The current government of the President Rafael Correa took care of the problem and solved it, as much of the Ecuadorian agriculture is generated in this area, and taking advantage that the bilateral relations between Ecuador and China are passing though their bets moments and treaties of economic and technological cooperation toward our country have grown, the Cañar River Flood Control Project financed by China, is now a reality so waited and so important, because of their complexity.

The Cañar River Flood Control Project is part of Bulubulu-Canar-Naranjal system; since 2012 the Nacional Secretariat of Agua, under the bilateral agreements between Ecuador and China, hired the "China International Water & Electric Corp. (CWE) to build the project and also Consortium Cañar; they signed up an agreement between UCUENCA EP, ACSAM CONSULTORES and CONSULTORIA TECNICA CIA LTDA to supervise the project "Cañar River Flood Control". The project is currently in its final phase of construction with different fronts of work, this project involves an area of influence of approximately 40,560 hectares, benefiting a population of 50.126 people and a total cost of \$ 233'000,427, 59.

JUSTIFICATION

Through this analysis, I aim to present the benefits and the positive & negative effects due to the interrelationship of the Chinese company CWE with the Republic of Ecuador, so we can evaluate the social and economic impact that the construction of this project was caused in one of the most important areas of the Ecuadorian agriculture. Therefore, this research work is a view from a multiple perspective, which is necessary to understand the interrelated events that occur in Ecuador that seek to achieve an increase -without precedents in previous years- in the standard of living of its inhabitants; so with this analysis I will show that the cooperation project with the Chinese company CWE, will be favorable, in the social and economic ambit.

OBJECTIVES ANALYSIS

General objective

As a general objective I will analyze the social and economic impacts in the project construction of the Cañar River Flood Control and also identify the effects, benefits and possible negative consequences in the area of influence.

Specific objectives

The specific objectives are:

- To analyze the principles of international cooperation
- To analyze the legal framework of Cañar River Flood Control Project.
- To analyze the agreements between China and Ecuador and the participation of the companies involved in the work and their respective roles.
- To determine the positive and negative effects of the project in the agricultural sector in the area of influence.
- To quantify and map the social and economic impacts generated by the construction of the project in the affected region.

CHAPTER I:

THEORETICAL FRAMEWORK OF INTERNATIONAL COOPERATION FOR THE DEVELOPMENT

1.1 Concepts and background of International Cooperation

1.1.1 Concepts of International Cooperation

Cooperate- *"To work together with another person or others for the same purpose."*
(Dictionary of the Royal Academy of Language).

According to K. Marx, cooperation is *"the coordinated and assembled way of work of many workers, in accordance with a plan, in the same production process or in different production processes, but linked"* (Marx & Engels, 2007, pág. 281)

The International Economic Cooperation for the development was born as a fundamental instrument of nations; as a means to build and solve the economic and political inequalities between countries and as a fundamental pillar in the quest for humanity to live in harmony and peace. According to Gamboa, in general and simple terms, it is understood as a set of actions and tools of international character aimed at mobilizing resources and exchange experiences between developed countries and developing countries to achieve common goals stipulated in the global agenda and based on solidarity, equity, effectiveness, sustainability, responsibility and mutual interest criteria. It seeks to permanent increase and the sustainability of social, economic, political and cultural development levels of developing countries, through the eradication of poverty and the end of social exclusion, both in education and in health and environment conservation. (Gamboa, 2007, pág. 36)

1.1.2 International Cooperation, Historical Review

Over time, international cooperation has changed its approaches, methods, actors and relations between them; it has helped to serve many countries to fight against poverty and inequality giving new guidelines, having a permanent participation and earning a mutual benefit between developed countries and developing countries, without this

act being taken as an intrusion from cooperating countries in the destinations of developing countries.

The first International Cooperation expressions started in 1812, when the US Congress approved the Act to assist Venezuela citizens, after the catastrophic earthquake that hit this country; this act was considered the first American humanitarian aid to other countries. Also in 1840, the United States sent food aid to Ireland before the famine suffered in the island nation. (Lallende, 2010, pág. 292)

During World War I in 1918, the US government sent 6.23 million tons of food aid to its European allies. In 1919, by the Treaty of Versailles, the League of Nations was founded, in order to promote peace and international security. One of the contributions of the League of Nations was that China requested foreign aid with the purpose of sending Chinese citizens to Europe and the US to be trained on health and hygiene issues, and in the same way it is counted on the presence of foreign experts in China, which also expanded to transport and education issues.

From 1929 on till the beginning of World War II, the first international agreements were created to regulate the trade of some basic products: The International Tin Agreement in 1931, the Wheat Agreement in 1933, the International Rubber Agreement in 1934, and the Sugar Agreement in 1937. With the beginning of World War II, all agreements and interests of cooperation fell together with the League of Nations, as the countries involved were the creators of this organization.

In 1943, during the World War II, there were millions of displaced people and it was necessary to create the Administration for Refugee Care and Rehabilitation, as a good stock of cooperation between the allies. By 1944, with the creation of the Bretton Woods, Monetary and Financial Conference of the United Nations resolutions, and to strengthen trade and financial relations between the industrialized countries of the world were established, seeking first peace among its members, and as a result of these agreements, awareness in favor of underdeveloped countries was marked because of international asymmetries and the risk of its enhancement. (Lallende, 2010, pág. 294)

In 1945, representatives of 50 countries met in San Francisco –USA-, at the United Nations Conference on International Organization, to draw up the United Nations Charter. This Charter was signed on June 26, 1945 and the objectives of the United Nations spread into an economic, social and human rights field. Article 55: In order to create stability and well-being conditions necessary for peaceful and friendly relations among nations based on respect for the principle of equal rights and self-determination of peoples, this Organization shall promote:

- a.** Higher standards of living, full employment, and economic and social progress development conditions;
- b.** The solution of international problems of an economic, social and health type, and other related problems; the international cooperation in cultural and educational fields; and, universal respect for human rights and fundamental freedoms for all, without distinction as to race, gender, language or religion, and the effectiveness of such rights and freedoms. (Naciones Unidas, 2015)

In 1947, the United States Secretary of State, General Marshall, began with a plan to help the war-torn nations, so the cooperation of the United Nations learns from the Marshall Plan by watching the incredible power of recovery, offered by US cooperation for a devastated Europe. The international cooperation modern notion born after World War II, because of the need for political, economic and social order of Europe and its reconstruction and the birth and involving of the new independent nations of Africa and Asia in a post-colonial field.

Gamboa express, since the beginning the international cooperation has been marked by the predominance of bilateral international relations, due to the European preference to direct its development aid for its former colonies, such as the US interest to attract developing countries into its sphere of political and economic influence, showing the cooperation as an economic power instrument to solve their economic problems and market distortions, but it must be seen in the best sense of the word and define it as a politic instrument in favor of all world countries. From the 60s, through the creation and promotion of Regional Development Banks, the expansion of cooperation through multilateral relations began.

(Gamboa, 2007, pág. 35)

In the late 40s, the named “Truman Doctrine”, was the first major expression of American policy of “communism repression” during the Cold War. President Harry S. Truman, in his Report to the Nation, included the so-called "Point Four", when for the first time, the concept of “underdevelopment” was mentioned; it stated, among other aspects, that the United States should promote an audacious new program that would make scientific advances and industrial progress available for underdeveloped areas for its improvement and economic growth; the purpose was to help the free countries around the world, through their own efforts, to produce more food, more clothing, more materials for the construction and mechanical energy to relieve their heavy loads. The effect would be the creation of the Comprehensive Technical Assistance Program, dedicated to finance projects in developing countries that were members of the UN. (Ocaña, 2003)

The 50s were characterized as a period in which the end of the World War II left the United States as the leader of a growing economy and by the emergence of new States as a result of decolonization, which generated an appropriate setting for the start of a new era of international cooperation. With the onset of the Cold War, United States on one side and the Soviet Union on the other side (1945 to 1990), cooperation was not a purpose for development aid but a tool to facilitate the recovery of Western Europe after World War II and the confrontations between East and West were so determined that each block addressed their aid flows according to their interests.

United States takes the initiative for the reconstruction of Europe in order to stop the socialist trends and implement the reconstruction program known as the Marshall Plan; this was a model of cooperation focused primarily on equating development with economic growth. (Orellana, 2012, pág. 287)

As it was mentioned before, it is important to note that at this stage the process of decolonization in Africa and Asia began, where both sides needed to find a way to live in the new economic and politic reality; on the one hand, the former colonizers who had great geopolitical interest and on the other hand, the independent ones that needed financial and technical assistance for development, as there was a clear

development environment for the exploitation of the colonizing countries. The origin of the current European cooperation starts in 1957 with the signing of the Treaty of Rome, which marked the creation of the European Common Market. Gradually the development cooperation took more ground in the political and social ambit. The Christian religions also gained prominence in this field and the creation of the first generation of non-governmental organizations (NGOs) dedicated to promoting the development was raised. In the 60s, the concern of governments and organizations was created under the environment of developmental theories, where the growth of industries was the only way to achieve development. Under this thinking, cooperation became an instrument to help the transferee of essential resources in order to enable countries to achieve development and feeding the absence of capital and technology. (Orellana, 2012, pág. 288)

In 1964, was made a consensus about the need to increase aid flows to developing countries, which was driven by the UN through the Organization for Economic Cooperation and Development. In this consensus the global target adopted 5% annual growth in GNP and focused on trade issues that would give greater openness to small countries. By 1985 the Expanded Program of Technical Assistance and the United Nations Special Fund merged together to create the program of the United Nations for the Development, being the most important institution of international technical cooperation agency. As it was necessary to have a report to review the dynamics of international aid, in 1969 the Pearson report was created; it was ordered by Robert McNamara to the Ex Canadian Prime Minister Lester. This report evaluated the results of the last two decades of international aid and generated recommendations for the future, being one of the proposals that developed countries allocate 0.7% of their GNP to assist the development.

(UNESCO, 1970, pág. 16)

The 70s took place in conditions in which the international community became more aware about the need for a better balance between rich and poor countries; international organizations took leading roles in the field of cooperation; however, after the appearance of the Pearson report, inequalities between developed and developing countries had grown. This decade was a period in which unfortunately the cooperation and financial aid was used as a means to increase the geostrategic

interests of the rich countries, limiting the real impact of development because much of the aid that was granted was not for long term and was only for political and commercial advantage. (Orellana, 2012, pág. 290)

As if that was not enough, in this decade two major crises were unleashed as the recession that the USA passed through, forced them to devalue its currency and affected many countries that had reserves in dollars leaving them even poorer; On the other hand, the oil producing countries increased the oil price in order to reduce the impact that this crisis would generate in their economies; this resulted in unemployment, inflation and falling industry, especially among non-oil exporting countries. This issue left the needs of development in the background as donor countries needed to get out of the fall in which they were and also the organizations focused its support on this matter.

The 80s were a complicated period for developing countries since the excess of international loans left them indebted as a consequence of the inefficient use of resources; a financial crisis broke out starting with Mexico and then Brazil, they both declared their inability to pay and then more countries followed. This situation marked the beginning of reforms and adjustments of debt, led by the IMF. (Lallende, 2010, pág. 301)

These problems of payment of foreign debt, totally affected governments of indebted states and their ability to promote development, as domestic budgets were reduced dramatically. This affected the society in general on all segments of the poorest sectors of the society as their incomes were reduced and public services they had access to, were totally damaged; despite the efforts made by the UN to adopt a resolution to non-payment of such debt, but the US voted against this resolution.

The 90s began with the end of the Cold War, leaving the USA as the only economic and arms world power, so international cooperation began to take another tack by not having to cooperate by state policy but only as monetary and trade policy. Also the fight against poverty and underdevelopment strengthened. This goal began to become a priority issue for developed countries and also for agencies and financial institutions. The UN program for development put people as the focal point for

development, as this new ideology prioritized the lives of people and their environment, so the pursuit of efficiency of production processes and the economic growth could contribute to be part of the development. In 1996, since external debts of countries were unsustainable and very unfavorable, both the International Monetary Fund and the World Bank jointly launched the initiative to reduce and make adjustments to debts of developing countries as its poverty reduction policies were completely limited. The new millennium began with high expectations, the UN and its financial institutions announced their program "A Better World for All"; this title reflected the commitment of many countries to join efforts to fight poverty, turning it as the main objective. New optics emerges to look for human development, human rights, when these two grew together, they increased the capacity of the people and their rights and freedoms were protected; this approach by UN agencies for cooperation and development is currently applied.

At the Millennium Summit of the United Nations in 2000, all member states jointly pledged by signing the Millennium Declaration, to join efforts for the victims of global poverty and take action to advance the paths of peace and human development. The Millennium Declaration, among many other things, led to the approval of 8 Millennium Development Goals focused on qualitative and quantitative aspects which should be met by 2015.

These objectives are listed below:

Goal 1: To eradicate extreme poverty and hunger. To reduce by half the proportion of people living on less than one dollar a day and to halve the proportion of people who suffer from hunger between 1990 and 2015.

Goal 2: To achieve universal primary education. Ensure that boys and girls around the world to complete a full course of primary schooling.

Goal 3: To promote gender equality and empower women. Eliminate gender disparities in primary and secondary equation, preferably by 2005 and no later than 2015.

Goal 4: To reduce child mortality. Reduce by two thirds the mortality rate of children under five.

Goal 5: To improve maternal health. Reduce by two thirds the rate of maternal mortality.

Goal 6: To combat HIV / AIDS, malaria and other diseases. Halt and begin to reverse the spread of HIV / AIDS and other diseases.

Goal 7: To ensure environmental sustainability. Reduce by half the proportion of people without sustainable access to safe drinking water and sanitation, by 2015.

Goal 8: To develop a global partnership for development. Reform the aid and trade with a special poorer countries deal. (United Nations, 2015)

Globalization and technological advances have enabled the growth of interest in international relations, since many agencies and countries feel a responsibility to strengthen the development especially in the countries of Latin America and Africa, as they show the highest rates of poverty and underdevelopment. This last decade and after years of struggle against underdevelopment, South American countries still have difficulties in having a sustained development since their external debt appears to be the solution to many governments that maintain very high and very unequal trade balance, limiting this kind of projects in terms of development and Latin American culture has many drawbacks due to social inequalities. The Paris Declaration on Aid Effectiveness adopted by the Development Assistance was approved in 2005 was a document that defined the establishment of specific practices in aid quality, including 51 commitments and 12 indicators to assess compliance, adding five elements: ownership, harmonization, alignment, managing for results and accountability. Its aim was to promote more and better aid governance, the implementation of its guidelines on the part of donors and recipients continues in process. (Lallende, 2010, pág. 308)

Given the drawbacks and the global economic crisis that erupted periodically the last one in 2008, developed countries limited international aid flows because capital flows remained committed and without the possibility of incorporating new sources of cooperation, trying to separate themselves of the important aid commitments; on the other hand, developing countries felt relieved not to have sources of funding, because of the difficult management and control, began to give bigger impetus to new forms of cooperation.

South-South cooperation expanded significantly over the last decade, agreeing with the rising prominence of these countries in world politics and economics, which have

chosen the socialist ideology as their governance; especially in some South American countries, which seemed not to adjust to the ideology line of the developed countries that retain liberalism and capitalism as their thinking to govern. The International Development Cooperation today, cannot be limited to the Official Development Assistance, to Bilateral Cooperation agreements between heads of state or Trade Agreements. The important thing is that the actors must open field within the idea of development to extend its intervention and into the practice of participatory democracy, forging punctuated actions for the benefit of society, and human growth development.

1.2 International Cooperation Modalities, Types and Instruments

The international cooperation modalities and types are conceptual distinctions about the different ways the Official Development Assistance (ODA) is managed, while the instruments of international cooperation are the different tools which the actors of the international system run to coordinate their actions.

The various cooperation modalities and instruments are constantly evolving, as the practice of development cooperation learns from experience and evolves in turn.

1.2.1 International Cooperation Types

International cooperation will be implemented through the following types:

- **North-South or vertical cooperation:** this is the most common form of international cooperation that exists between developed and developing countries, the first providing both financial resources and technical assistance to support the development efforts of the latter.
- **Horizontal cooperation:** such cooperation is between countries with the same or similar levels of development.
- **South-South cooperation:** such cooperation is between developing countries, especially among middle-income countries and often occurs in certain sectors where the donor country shows its experience;
- **Triangular cooperation:** usually a combination of horizontal cooperation and South-South cooperation. In this type of cooperation, a developed country partners

with a country of average development, which usually provides the technical element to perform actions on behalf of a less developed third country.

- **Regional cooperation:** these are cooperation programs on specific issues: health, environment, trade, etc., which correspond to a specific region, such as Latin America, the Caribbean, etc. These programs have the goal to strengthen integration ties among member countries, to create sectorial networks and to clarify issues of common interest in the region. (Ministerio de Economía, , 2015)

1.2.2 International Cooperation Modalities

We have to differentiate many forms of international cooperation, all of them setting off a target, which is to cooperate, but we also find cooperation as an object of mutual benefit and as a business that provides revenues. In any case, many countries have managed to handle very well the issue of international cooperation and have made it out of underdevelopment.

Below we identify some of the forms of international cooperation:

- **Linked Aid:** When funds are used to acquire goods or services, normally from the donor country.
- **Unlinked Aid:** When there are no restrictions.
- **Nonrefundable Cooperation:** It is the cooperation provided by donors through the allocation of cash resources in order to support development projects or activities.
- **Refundable Cooperation:** Refers to financing cash under conditions of interest and favorable terms, for the development of economic activities of a developing country.
- **Public support (official):** It is that which comes from public funds, with freedom of who manages it, which is called Official Development Assistance (ODA) and it is subject to the rules of the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD).
- **Private Cooperation:** It is especially a kind of cooperation of private order between companies from different countries; however, it often happens that the governments have taken bilateral approach actions, but companies often do not get involved in government programs and usually take the form of technical assistance and technology transfer.

- **Bilateral cooperation:** It is the official cooperation that takes place between two countries on the basis of agreements or agreements between the two.
 - **Multilateral cooperation:** It is the official cooperation offered by international organizations or institutions to governments, such as the United Nations, the IMF, the IDB, the World Bank and European Union, among others.
 - **Decentralized Cooperation:** It is the cooperation that regional and local administrations channel through a direct relationship with local public and private actors in the recipient countries. Such cooperation is a recent trend and it is consolidated in the context of strengthening cities and regions as actors in implementation of international cooperation.
 - **NGO Cooperation:** Non-governmental cooperation is considered to transfer resources channeled by private social entities, either generating them through fees, donations or sale of services. Receiver actors of this type of cooperation are the nongovernmental organizations.
- (Ministerio de Economía, , 2015)

1.2.3 Cooperation Instruments

The following are the instruments of international cooperation

I. Traditional instruments:

- a) **Projects:** These are a set of activities designed to achieve a specific objective clearly stated in the program content, within a specified period of time and with a defined budget.
- b) **Cooperation programs:** These are a series of established actions in order to improve fully and sustainable living conditions in a particular region or country, which goals are aligned with the strategic plans of the country.
- c) **Technical Cooperation:** It is a cooperation focused on knowledge transfer and technical and management skills, in order to enhance the capabilities of individuals, public institutions and social organizations to promote their own development cooperation.

- d) **Global funds:** Global funds constitute stocks around certain thematic or regional areas, to which donors make their contributions, but they are managed autonomously, such as the Global Fund for AIDS, tuberculosis and malaria.
- e) **Fiduciary funds:** These are funds donated by governments and international organizations for specific projects, which get benefits for donors that range from accountability and transparency at all stages of the projects to the freedom to choose the country or region where the project will start and its type.
- f) **Food Aid:** Food aid is a transfer of resources to individual countries or sectors as food. It is implemented through donations, by selling (with some degree of concession) or in the form of monetary donations or loans "linked" to food purchases.
- g) **General Budget Support:** General budget support implies that donors contribute funds directly to the public treasury of the host country. It becomes an effective instrument when the government pursues a strategy of poverty reduction, and there must be a high degree of confidence between the government and its partners, as the host country should be able to maintain economic discipline and control of public spending.
- h) **Sectorial budget support:** In the sectorial approach, the contribution relates to a specific sector (education, health, etc.) for which basic agreements are reached among the partners of political cooperation, usually in relation to the achievement of certain objectives and certain default management schemes, in which performance indicators play a very important role.
- i) **Sector-wide approach:** It is an approach and process for collaboration of all stakeholders in support of a sector or an appropriate program which is led by the government in a coherent, comprehensive and coordinated way.
- j) **Exchange of debt:** The debt exchange is a mechanism where a certain amount of external debt from the debtor government of a developing country is changed to be invested in education or environmental projects, this mechanism involves a transfer from North to South.
- k) **Shopping donors:** It is the joint funding by donors of a series of activities through a common account, through which the resources are kept in a basket, separate from any other source for the same purposes.

II. Cooperation instruments for special situations:

- a) **Humanitarian aid:** Given its temporary and unplanned intervention it is not considered as cooperation for the development. Overall, it is a diverse set of operations to aid disaster victims, aimed at alleviating their suffering, ensuring their livelihood, protecting their fundamental rights and defending their dignity; and, sometimes, to stop the process of socio-economic disintegration of the community and prepare them to cope with natural, exceptional or cyclical disasters. It may be provided by national or international actors.

III. Other cooperation instruments:

- a) **Co-development Interventions:** It can be summarized in the phrase "development in origin and integration in destination": that is, actions aimed at achieving human development in countries that are the source of migration and actions oriented to achieve integration of immigrants in the host societies.

(Ministerio de Economía, , 2015)

1.3 International Cooperation Actors

The system of cooperation for the development is made up of actors of various features and functions, a place where public and private, general and specialized organizations coexist; from North and South with different fronts and strategies. In general, it is important to distinguish between public and private institutions. Among the former are the multilateral institutions, governments of donor and recipient countries, regional and local public administrations, universities, etc.

1.3.1 Public Actors

Multilateral agencies: These are organizations that work with the support of its members, usually with the aim of promoting development programs such as the World Bank and the IMF which are financial; and the European Union which is governmental, etc.

- **States:** Formed by Ministries, Cooperation Agencies, etc. They are interventions promoted directly by governments; it is a cooperation that is part of foreign policy or international relations of the donor.
- a) **Universities:** The University is considered an important agent of cooperation by major international organizations and bilateral donors; however, in many cases their role is limited to the traditional approach of granting scholarships, courses of cooperation or research on the development process
- b) **Organismos multilaterales:** Son entidades que trabajan con el aporte de sus integrantes, normalmente con el fin de promover programas para el desarrollo como el Banco Mundial, FMI que son de carácter financiero, y la Unión Europea de carácter gubernamental, etc.
- c) **Estados:** Conformado por Ministerios, Agencias de Cooperación, etc. Son intervenciones promovidas directamente por los gobiernos; es una cooperación que forma parte de la política exterior o de las relaciones internacionales del donante.
- d) **Universidades:** La universidad es considerada un agente importante de la cooperación por los principales organismos internacionales y los donantes bilaterales, sin embargo en muchos casos su papel se limita al enfoque tradicional de concesión de becas, cursos de cooperación o investigaciones sobre el proceso de desarrollo. (Gamboa, 2007)

1.3.2 Private Actors

- a) **NGOs (Associations and Foundations)** are social initiative organizations with humanitarian purposes that are independent of the public system and nonprofit; funding is through the cooperation of citizens, state contributions and execution of events.
- b) • **Companies:** they are private entities formed by citizens who have contributed with their own capital and seek to satisfy their own interests.
- c) • **Trade unions and other social groups:** These are formed by people who care about unfair events in the world; they also get their financing through collections, events, etc. (Gamboa, 2007)

1.4 International Cooperation objectives and logic

A very important part of the cooperation is that its objective should be the collaboration between the parties seeking development goals; it means that it may be convenient for both to support on each other, that the development purposes of one or both are met. This is a distinctive feature of modern cooperation that tends to be called Cooperation for the Development; it will always be possible to associate all international development cooperation objectives, but the practice tends to exclude some. For example, relations concerning the development of war industries are excluded from conventional aid flows.

Thus, for example, it is not usual to explicit in cooperation agreements that the provision of technical assistance aims to open up the market of the recipient country with the help of equipment, technology and service of the country granting the aid. Although this is a perfectly legal way, maybe it is not so convenient in the background for the development of the country attended; however, it is important as in any negotiation, that the involved parties know how to identify, accept and neutralize these objectives; this capacity requires tacit understanding, and in turn, professionalization in the management of cooperation, which has always had implicit costs. (Gamboa, 2007)

1.4.1 General Objectives

Aid and cooperation organizations considered non-profit, transfer resources to support other countries in order to solve problems of development, in defense of the recognition of human beings in their individual and collective character.

Another objective is the defense of human rights, citizen participation regardless of gender, essential freedoms, non-discrimination on belief, race, gender or culture, and livelihood of peace.

Also, development cooperation policies aimed at helping economic growth to be equal in order to try to end global poverty, respecting the international standards already established.

1.4.2 Specific Objectives

- Encourage economic and social development in the poorest countries, moving human and material resources to a higher standard of living of the disadvantaged.
- Help support security and international peace.
- Establish humanitarian aid to emergency circumstances.
- Strengthen democratic systems, especially the ones regarding fundamental freedoms and human rights.
- Originate relations between countries, especially those that are developing.

1.5 International Cooperation in Ecuador and the relationship between China and Ecuador

1.5.1 International Cooperation In Ecuador

Ecuador's participation in the field of international cooperation is given from the early sixties when the United States was affected by problems with Cuba and the Castro revolution, while investigating a solution to avoid spreading of "communism" in Latin America by carrying on a policy of cooperation called Alliance for Progress. At that time, Ecuador became an oil country and promoted imports of goods and services; it also started with the help of a model based on the developmental theory that promotes industrialization projects especially import substitution, where also human capital development and overcoming poverty was sought.

Since 2000, from the Millennium Development Goals and dollarization, official assistance for the development increased to focus donations to the challenges that were taken at the Millennium Summit. In the government of Lucio Gutierrez, the institution empowered for that was the National Secretary of Planning and Development (SENPLADES). At the beginning of President Alfredo Palacio (2005-

2007), the Millennium Development Goals were disclosed as State Policy, constituting the Secretariat of Millennium Goals (SODEM) as the coordinating agency of the ministries and other state institutions to carry out the goals and objectives of the millennium.

Since 2007, the government of President Rafael Correa, started; it was called "The Citizens' Revolution". The Government Plan determined the guidelines of an alternative agenda for Ecuador and the National Development Plan (NDP) 2007-2010 was enacted and updated through the National Plan for Good Living (PNBV) 2009-2013. The PNBV is a tool of public conjunction of the organization, budget and evaluation system through which the country attempts to approach the good living

(OEA, 2012, pág. 11)

The non-refundable collaboration that was part of the implementation of foreign policy now comes under the complementary pattern of cooperation for sustainable development of Ecuador; it is how the Ecuadorian Agency for International Cooperation (AGECI), is ascribed to the SENPLADES so both public investment and not refundable cooperation respond to the strategic planning. The AGECI created general tactics of International Cooperation, policies and management statutes and the development and application of management tools of the Ecuadorian International Cooperation System in order to strengthen cooperation ties through constant, permanent and perpetual relations with different countries and agencies working in Ecuador, so that the actions to be perform, under the National Development Plan, induce human development, fortify capacities, move technologies and generate equity and social cohesion.

The AGECI, from its creation up to date, had changes that respond to the State Reform process, so its institutional figure changes to the Technical Secretariat for International Cooperation (SETECI) and varies SETECI secondment to the Ministry of Foreign Affairs, Trade and Integration and skills are transferred on the signing of agreements, registration, control and monitoring of the work of foreign NGOs in the country. (OEA, 2012)

International collaboration in Ecuador has had multiple stages and actors who intervened to the country's progress as illustrated below:

- The collaboration between Belgium and Ecuador works under the particularity of immediate bilateral aid which has earmarked 20 million euros to support the axes of the national process of good living, eliminating the need to change the production model, and reforming of the democratic state. Belgian cooperation is equally under the non-refundable technical and financial contribution. The Belgian cooperation is not working under budgetary reinforcement due to the limited amount of funds.
- The collaboration between Germany and Ecuador was immediately executed under the kind of technical and financial cooperation from 1973 through elements such as international and national experts, training courses, workshops, etc., and secondly financial cooperation under components of non-refundable financial cooperation and loans.
- The American collaboration in the country is handled through the United States Agency for International Development, under bilateral agreements since 1962; the American cooperation is processed under the type of non-refundable financial and technical cooperation; funds are regularized under companies or NGOs, most of the funds were traded on democracy and environment in recent years.
- International collaboration with Italy is managed since 1988 as a bilateral agreement; the establishment of the Italo-Ecuadorian Fund was created by the setting on the convention of the debt in 2003 to finance development projects, aligned to the Millennium Development Goals and National Plan for Good living. Italy channels its cooperation with Ecuador under the debt exchange component for development donations and loans. The debt exchange programs are made through projects in the neediest provinces; the loans are negotiated in the area of health, water and sanitation, and have implemented several donations of nearly \$ 3 million to eliminate the shortage.
- The Japanese cooperation in Ecuador was managed under the Exchange of Volunteers in 1991 and the Technical Collaboration Agreement between Ecuador

and Japan in 1992; the non-refundable financial cooperation was suspended for Ecuador for its state of middle income country, so Technical cooperation mode under project mechanisms, scholarships and volunteers is still conserved today. (Spain Embassy, 2014)

1.5.2 Bilateral Relation China – Ecuador

Since 2009, the energetic support placed Ecuador among the four major recipients of funding and investment of China in Latin America. This relation speaking in political and economic terms has been presented by the governments of both countries as a cooperation of mutual benefit, based on principles of equality, non-obstruction, and energy supplement. However, much has been said about the acting of China in Ecuador and the real challenges and benefits that are behind this relation of cooperation; Ecuador has turned to China focused essentially on the mission of diversifying the energetic matrix in order to obtain financing through the Eximbank of China and the China Development Bank.

In the actuality exist many coincidences that integrated both nations and governments, in areas of international philosophical and social policies in general, it made possible to have a continuous opening in the cooperation between the Popular Republic of China and the Republic of Ecuador; it is established on the absolute respect for national sovereignty requirements and not meddling in the internal affairs of each government.

It's important for Ecuadorian Government to handle the clearest ways possible to promote a new and secure exchange that permit to equilibrate the bilateral trade, identifying new areas to encourage Chinese investment in Ecuadorian territory and allowing access to more inclusive partnerships.

The strategic relationship between Ecuador and China is strengthening through the linked work of Cooperation for the Development in different areas: political, commercial, financial, investment, culture, education, science and technology, training and technical assistance. There is an affinity criterion in terms of

international policies, which benefits primarily multilateralism, environmental protection, and promotion of a new international financial building.

The governments of both countries have a clear view about the strengthening of the Ecuadorian-Chinese bilateral relation that inserts into an area of common interest, where direct agreements reflect the model of interaction wining-wining, and to obtain shared benefits, through the realization of fundamental plans for development. (CEPRID, 2015)

1.5.2.1 Bilateral relation objectives between Ecuador and China

The growth of bilateral relation with the Popular Republic of China, the Republic of Ecuador directs its best efforts to primarily secure the following results:

- To favor Chinese investment in strategic and fruitful sectors of the Ecuadorian society as a whole.
- To identify additional topics in the political-diplomatic issues; encourage and strengthen trade relations; increase bilateral cooperation and work together on issues like human mobility.
- To promote the exportations of Ecuadorian products to the Chinese market.
- To implement new players in the bilateral trade agenda (small and medium production, artisanal sector; SMEs).
- To assist in the field of science and technology, in order to position segments for the actual exchange of experiences.
- To increase bilateral trade to cultural and educational level.
- Develop bilateral funding agreements to effectively lead the development of both countries.
- To include social areas such as housing, health and labor issues in the new bilateral agenda.
- At the multilateral level; To communicate the experiences and knowledge obtained by Ecuador about the integration methods for Latin American region, especially as part of the Community of Latin American and Caribbean States (CELAC), Union of South American Nations (UNASUR), Bolivarian Alliance

for the Peoples of Our America - Treaty of Commerce of the People (ALBA-TCP) and the Andean Community (CAN).

- To establish and work together with China on mutual benefit issues of the multilateral program and the new international financial building. (CEPRID, 2015)

1.5.2.2 Bilateral agreements between Ecuador and China

Since December of 2010, the first bilateral understandings were the followings:

- Registration of the Commercial Agreement for the construction of the Hydroelectric Toachi Pilatón, by the China Water and Electric Corp CWE (Quito, December 24, 2010).
- Anticipated commercialization of crude, signed between Petroecuador and "China National United Oil Corporation" PETROCHINA (Beijing, January 28, 2011).
- Settlement Agreement between the Coordinating Ministry of Security of Ecuador and the Chinese company CEIEC for Public Safety Plan (Quito, February 22, 2011.)
- Agreement registration with the company "Goldwind" for building up the Villanaco Project that consist in eleven Eolic turbines of 1.5 MW each one, with a total generating power amounts to 16.5 MW. (Loja, Ecuador, June 2011).
- Registration of the Commercial Agreement with the CEIT Company rehabilitation plan for the trans-railway. (July 6, 2011)
- Registration of the Credit Agreement with Eximbank to invest in the construction of the hydroelectric dam "Sopladora" - Gezhouba - (Beijing, October 18, 2011).
- Registration of the Trade Agreement for the construction of the Hydroelectric Delsitanisagua. This work will be built with the company Hidrochina. (Zamora Chinchipe, October 2011).
- Two Hydroelectric Plans: Mazar Dudas and Quijos are in construction by the company CNEEC.

- Sign of the "Agreement on Economic and Technical Cooperation between the Republic of China and the Republic of Ecuador" on December 21, 2011, Ecuador took non-refundable funds for its interest plans.
- Sign of the Agreement between the Electricity Corporation of Ecuador (CELEC EP) and the Public Company China Harbin Electric International Co. Ltd. for the construction of the Hydroelectric Project "Minas San Francisco". (December 30 2011).
- The Ministry of Coordinating Security and CEIEC signed the contract for the second phase of implementation of the plan of ECU-911 Integrated Security Service, according to which the MICS will have 8 centers of 911.
- The National Water Secretariat signed the agreements of flood control projects of Bulubulu, Cañar and Naranjal systems, by the Chinese company CWE (2011)

(CEPRID, 2015)

CHAPTER II:

DESCRIPTION OF CAÑAR RIVER FLOOD CONTROL PROJECT

2.1 Project Objectives

For decades the people who depend on agriculture, livestock and fishing have been affected by the cruel winters that the Ecuadorian coast goes through every year; it causes millions of losses in the production of different crops that this land generously offers to the people who live there. Each period of time the Phenomenon of “El Niño” reaches the Ecuadorian coast and devastates thousands of hectares of crops, infrastructure, roads, housing, etc. This situation is even more severe than it is usually during the winter season each year.

In 2011 the national government through the National Secretariat for Water (SENAGUA) signed the agreement for the construction of the Bulu-Bulu, Cañar and Naranjal Flood Control; this would be managed by the company China International Water & Electric Corp CWE which aims the following objectives:

2.1.1 General Objectives

- To stabilize the riverbed of the Cañar water system
- To remediate and balance the environment of the project area.
- To conduct a land use planning
- To take advantage of water and soil resources for agricultural and the region's development

2.1.2 Specific Objectives

The project specifically aims to implement a comprehensive system of engineering measures for flood control and to stabilize the riverbed of the Cañar River water system. This will be done by establishing prevention actions and environmental mitigation that allows social and economic development of the region.

The works intended to be done are: contentions walls, dams, bridges, dam areas, roads and highways, sewers, gates, among other works to prevent flooding of crops, houses and populated areas when water flow increases, protecting more than 40560 hectares and benefiting a population of over 50.126 habitants.

2.2 Legal Framework Analysis

The construction of the project relies on a number of laws, both from the constitution as well as from the National Plan for Good Living, the Organic Law of National Hiring and the Water Act this will be following analyzed.

A. From the constitution of 2008.

Starting 2008, with the creation of the new constitution and the implementation of new items and rights for citizens, the national government starts to arrange and take care of sectors that have been affected by the winter such as animals breeding and agriculture in important and rich zones from the coast like the Guayas River Basin, some affluent and its area of influence, includes the control of Canar, Naranjal and Bulubulu rivers, from the adoption of new articles of the law and the government's commitment to ensure the good living. It proceeds to approve the construction of mega projects that generate employment and protect hundreds of hectares of crops thus improve thousands of people's lives living from these resources.

Based on these constitution's articles, the national government took the reins to raise the flood control project, as stated in Section 9 on the management of risk in Article 389 of the Constitution:

"The state will protect people, communities and nature against the negative effects of natural disasters or manmade by preserving at risk, disaster mitigation, recovery and improvement of social, economic and environmental conditions, in order to minimize the vulnerability conditions."

It's also important what the constitution says in chapter 2 about the good living right. The national government seeks social and economic balance of the population that is why it states in Article 14 that:

"It is recognized the right of people to live in a healthy and ecologically balanced environment that guarantees sustainability and good living, Sumak Kawsay.

It is of public interest to preserve the environment, the ecosystems, the biodiversity and the integrity of the genetic patrimony of the country, the prevention of environmental damage and the recovery of degraded natural areas. "

In Article 15 of the same chapter it is stated that: "The State shall promote, in the public and private sectors, the use of environmentally technologies and alternative non-polluting low impact energies" (Constitución, 2008)

B. National Plan for Good Living.

The National Plan for Good Living driven by the government tries to meet the objectives at plurinational and intercultural levels to achieve the good living of Ecuadorians. The proposals pose technical and political challenges seen as revolutions, generally formed in the following points:

1. Constitutional and Democratic Revolution
2. Ethical Revolution
3. Economic, Productive and Agrarian Revolution
4. Social Revolution
5. Revolution for dignity, sovereignty and Latin American integration

The flood control project is proposed in Section 3 on the Economic, Productive and Agrarian Revolution, considering the pursuit of equality and social balance.

All these interventions should maintain the ecological balance of the sources for which they must comply with the environmental regulations. All this will be accompanied by policies of equitable distribution of energy, water and other renewable resources, due to they are essential supplies for national industry and the country productive development.

It is also important the management of watersheds and water resources, where water is a fundamental human right, the strategy and territorial balance seek to achieve a good water management in each of its watershed both for human consumption as for irrigation and energy production.

(Secretaria Nacional de Planificacion y Desarrollo, 2015)

C. From the Water Act.

The Water Act approved in 2014 states that Articles 12, 313 and 318 of the Constitution of the Republic establish the principle that water is a strategic national heritage, of public use, inalienable domain, imprescriptible and indefeasible from the State. It is vital to nature and to the existence of human beings, reserved by for the State the right to manage, regulate, control and arrange strategic sectors, in accordance with the principles of environmental sustainability, precaution, prevention and efficiency. Article 411 states that the State shall guarantee the conservation, recovery and integrated management of water resources, watersheds and ecological flows associated with the hydrological cycle and that it will regulate any activity that could affect the quality and quantity of water, and the balance of ecosystems, especially sources and recharge areas.

According to Article 10 of Chapter II on the public water domain expresses that the public water domain consists of the following natural components:

- a) The rivers, lakes, ponds, wetlands, snow-capped mountains, glaciers and natural falls;
- b) Groundwater;
- c) The aquifers to the protection affects and of water resources;
- d) The water sources, understood these as the headwaters of the rivers and their affluent, fountains or growing natural springs that flow to the surface, or groundwater that is collected at the start of runoff.

Also in Article 11 of the same chapter about water infrastructure, it is considered works or water infrastructure the ones intended to the collection, removal, storage, regulation, leadership, control and use of water as will as sanitation, purification, treatment and reuse of water exploited and the water which is to artificially object

artificial recharge aquifers, acting on channels, correction of watercourses regime, protection against floods or water rising, such as dams, reservoirs, canals, pipelines, supply depots populations, sewage, rainwater collectors and wastewater, sanitation facilities, purification and treatment, gauging stations, piezometers, quality control networks and all the works and equipment necessary for the protection of the public water domain.

The works or hydraulic infrastructure may be public, private or community ownership, depending on who had built and financed, although its use is of public interest and are ruled by this Act. (Asamblea Nacional, 2014)

So, by Executive Decree 1088, published in the Official Gazette No 346 on May 27, 2008, the National Water Secretariat was established as a public entity of law under the Presidency of the Republic, which aims to drive the processes of managing water resources in an integrated and sustainable manner in the fields of basins, sub basins or watersheds and hydrogeological River Basin Districts according to the Water Act, its Regulations and other related regulations in force related.

(Secretaria Nacional del Agua, 2011, pág. 2)

D. International Agreements.

The Commission report on the Framework Agreement, between the government of Ecuador and the government of China about granting a preferential credit line to Ecuador, aims to recommend to the plenary of the National Assembly to approve or disapprove the said Convention.

The Constitution of the Republic commands the following:

Article 120 numeral 8, in relation to the National Assembly ascriptions, disposes that the National Assembly shall have the following powers and duties, in addition to those prescribed by law. In the literal 8; express approve or reject international treaties where applicable.

Article 417 provides that international treaties ratified by Ecuador shall be subject to the provisions of the Constitution and Article 419 literal 8 states that the ratification

or denunciation of international treaties require the prior approval of the National Assembly in cases that compromise the country with integration and trade agreements. Discussed this prior and binding opinion on the constitutionality of the Constitutional Court approved the agreement on April 13, 2010 which states:

1. Emit a favorable opinion of constitutionality of the agreement on Economic and Technical Cooperation between China and Ecuador, to fully conform to the text of the Constitution of the Republic.
2. To declare that after maintaining the international examined instrument, complete harmony and agreement with the precepts enshrined in the Magna Carta of Ecuador, it is appropriate to continue with the relevant procedure for its approval and later ratification. (Asamblea Nacional, Republica del Ecuador, 2010)

Once the agreements between the government of Ecuador and China were developed and tested, the National Secretariat for Water was assigned as the entity in charge of monitoring and supervising the work that will be undertaken by the company CWE, as expressed in the first clause of the Contract for the Cañar River Flood Control Project on June 14, 2012; a memorandum of understanding between the National Secretariat for Water and the public company China CWE was signed by which the two parties agreed to develop activities aimed at reciprocal cooperation and mutual support, as well as to strengthen relations between the Republics of Ecuador and China.

2.3 General Aspects of the Project

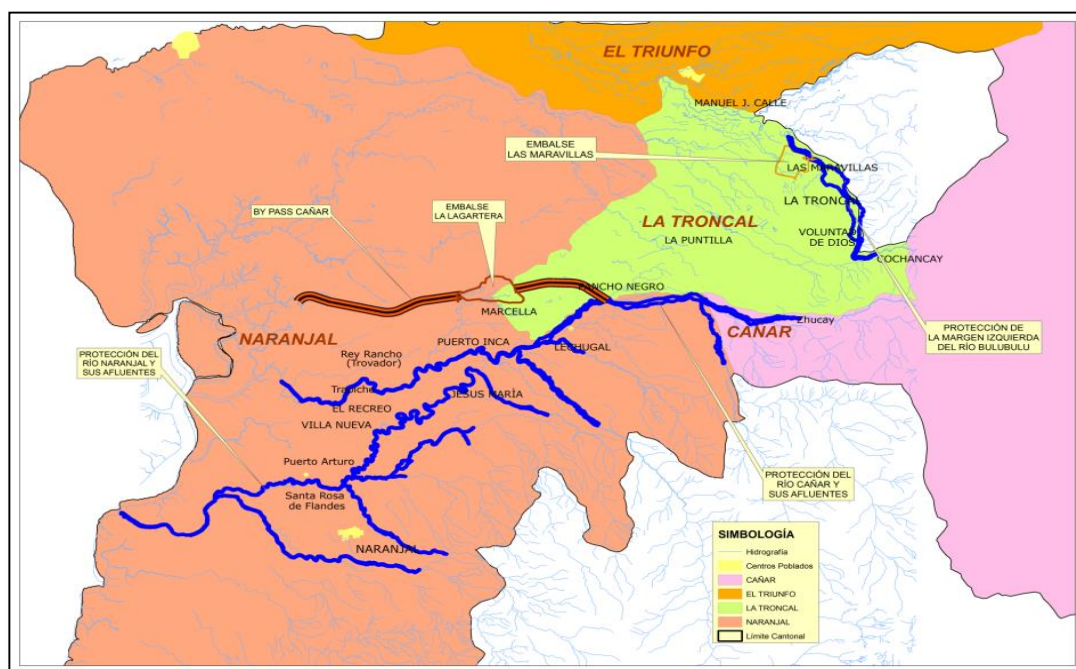
2.3.1 Location

The Cañar River rises in the knot of Azuay it goes direction southwest and empties into the Gulf of Guayaquil, opposite the Mondragon island. In one part of its course it is named Culebrillas until it joins the river Hatun-Cañar. It receives several affluent in its course as the Juncal, San Miguel, Suscal and San Vicente. Its source in the Andes is as a rushing and raging river, causing the excavation of the riverbed and consequently dragging stony material after its way up to the coast of Ecuador which

is deposited as sediment; this situation slows its flow and when rainfall it causes torrential overflow.

Historically over the years, the flooding of the Cañar River, has flooded productive areas leaving large losses on farmers who have seen their crops destroyed. From there, comes the desire of the population to solve this problem. As a solution it is considered to drag the river and construct dams on its shores. The project intervention area is located in the southeastern part of the basin of the Guayas River and covers an area of about 1,000 square kilometers representing 3% of the area of competence of SENAGUA.

Graphic 2.1: Area of the Project

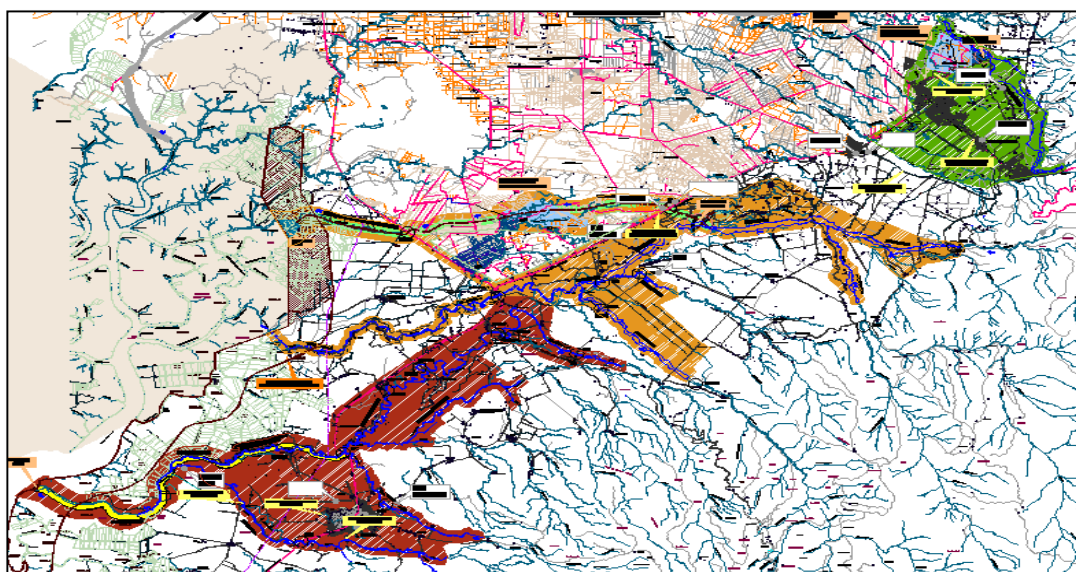


Elaboration: Asociación Consultoría Técnica - ACSAM Cía. Ltda

a) Direct Influence Area.

The area of direct influence of Cañar system reaches 13,925 hectares, protecting more than 27,000 inhabitants.

Graphic 2.2: Direct Influence Area

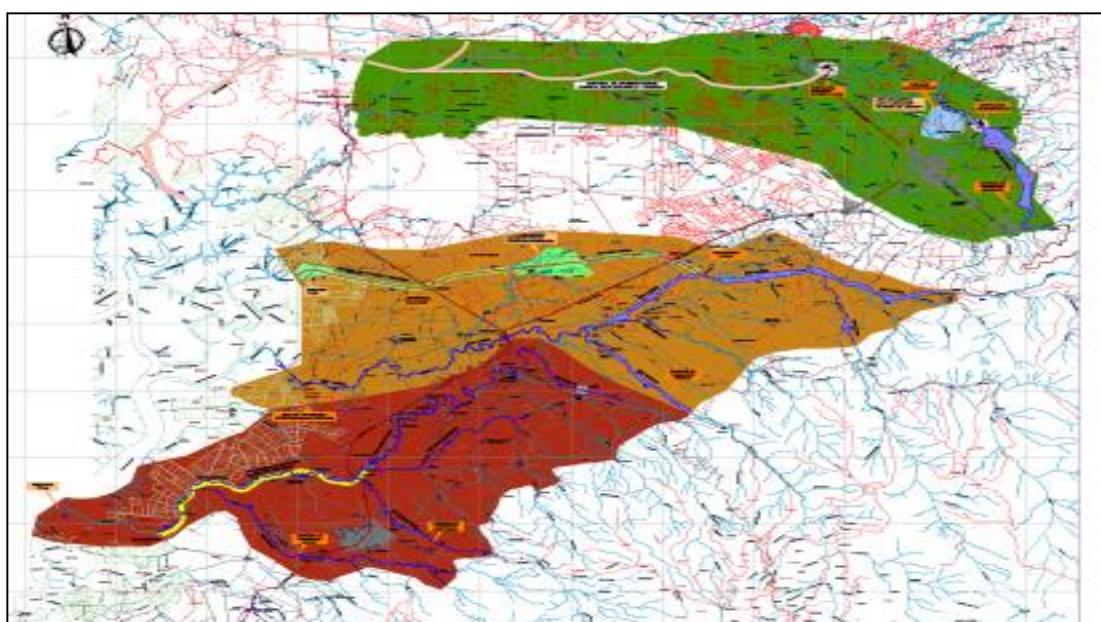


Elaboration: Asociación Consultoría Técnica - ACSAM Cía. Ltda

b) Indirect Influence Area

The area of indirect influence on the construction phase, in addition to those described in the area of direct influence target areas, joined the project and has reached 40,560 hectares and will protect more than 50,126 inhabitants of different cantons and parishes of the region, as shown in graphic 2.3.

Graphic 2.3: Indirect influence Area



Elaboration: Asociación Consultoría Técnica - ACSAM Cía. Ltda

2.3.2 Budget.

The budget for the work execution is divided into nine different activities corresponding to the project construction and other additional activities which constitute other costs such as audit, social mitigation and expropriation that can be seen in the following table.

Table 2.4: Project Budget

ACTIVITIES:	BUDGET
1. CAÑAR WATER DAM	19.434.783
2. BYPASS CAÑAR	64.243.999
3. LAGARTERA SETTLER	25.513.504
4. PROTECTION WORK IN RIVERS AND TORRENTS CONTROL	79.017.801
5. DRAINS	7.793.192
6. BRIDGES	18.827.694
7. ROUTES	7.691.999
8. ELECTRIC COMPONENT	961.831
9. ENVIRONMENTAL COMPONENT	244.409
TOTAL COST OF WORKS	223.729.211
SOCIAL MITIGATION PLAN	1.118.646
AUDIT	8.949.168
SCALING AND PRICE ADJUSTMENT, WORK	15.661.045
SCALING AND PRICE ADJUSTMENT, AUDIT	178.983
EXPROPIATIONS	28.703.765
TOTAL COST OF THE PROJECT	278.340.818

Elaboration: ACSAN Consultores

According to the cost study, the total investment in the construction of Cañar System is \$ 223'729.210.58. Applying the prepared investment schedule, 21% of it, it is the sum of USD45'948.830.94 will be spent in 2012; 35% USD79'186.265.80 in 2013; USD79'378.802.95 in 2014, and the balance of 9%, equivalent to USD20'215.310.83 in 2015.

On the other hand, there are additional costs on the social mitigation plan at a cost of USD 1'118.646, the audit of the project by the Consorcio Cañar at a cost of USD 8'949.168, reset work prices of USD 15'661.045, expropriations cost of USD 28'703.765 and USD 178,983 it is estimated to make price adjustments in audit, having a total project cost of USD 278'340.818.

2.3.3 Project execution term

The execution term for the construction of Cañar River Flood Control Project has been estimated for 36 months, or 12 quarters. The start of the construction work was on January 12, 2013 by SENAGUA.

2.3.4 Project sector and type.

According to SENPLADES data extracted from the information provided by the consulting ACSAN, it is evidenced that the sector in which the project is located is the No.8: Environmental Protection and Natural Disasters, and the works that are going to be performed specifically correspond to the subsector 8.6: Flood Control. However, has been found that the project works are related to other sectors and sub-sectors that correspond to 6.5 Irrigation Projects and 8.1 planning and controlling the environment.

Table 2.5: Sectors y subsectors of defined intervention

6	AGRICULTURE, LIVESTOCK AND FISHERY	6.1	Agricultural and Agroindustrial Development
		6.2	Agricultural livestock and fishery infrastructure
		6.3	Agricultural supplies, provision
		6.4	Crops recovery
		6.5	Irrigation
8	ENVIRONMENTAL PROTECTION AND NATURAL DISASTERS	8.1	Environmental Planning and Control
		8.2	Watersheds Protection and Protected natural areas
		8.3	Nurseries and Forestry
		8.4	Projects from Natural Desasters
		8.5	Human Resettlement
		8.6	Flood Control

Elaboration: ACSAN Consultores

CHAPTER III:

DIAGNOSIS OF THE PROBLEM IN THE PROJECT IMPLEMENTATION ZONE AND ANALYSIS OF THE AGREEMENTS AND PARTICIPATION OF THE INVOLVED ACTORS

3.1 Current Situation of the agricultural sector in the intervention area

During the winter, the flow of the rivers that form the Bulubulu, Cañar and Naranjal system overflows, causing major flooding and affecting large agricultural areas of the lower basins of the Guayas River, producing social, economic and environmental damages of considerable magnitude. It is considered a floodplain of 40,560 Hectares and economic losses that exceed \$ 100'000.000, 00 (one hundred million).

The current situation of the area of direct influence of the project, deals with the problem of floods that is it annually supported, it is analyzed from the point of view of the effects that it causes, and which are relate to population, housing, education, industry, commerce, tourism, agriculture, aquaculture, health and infrastructure.

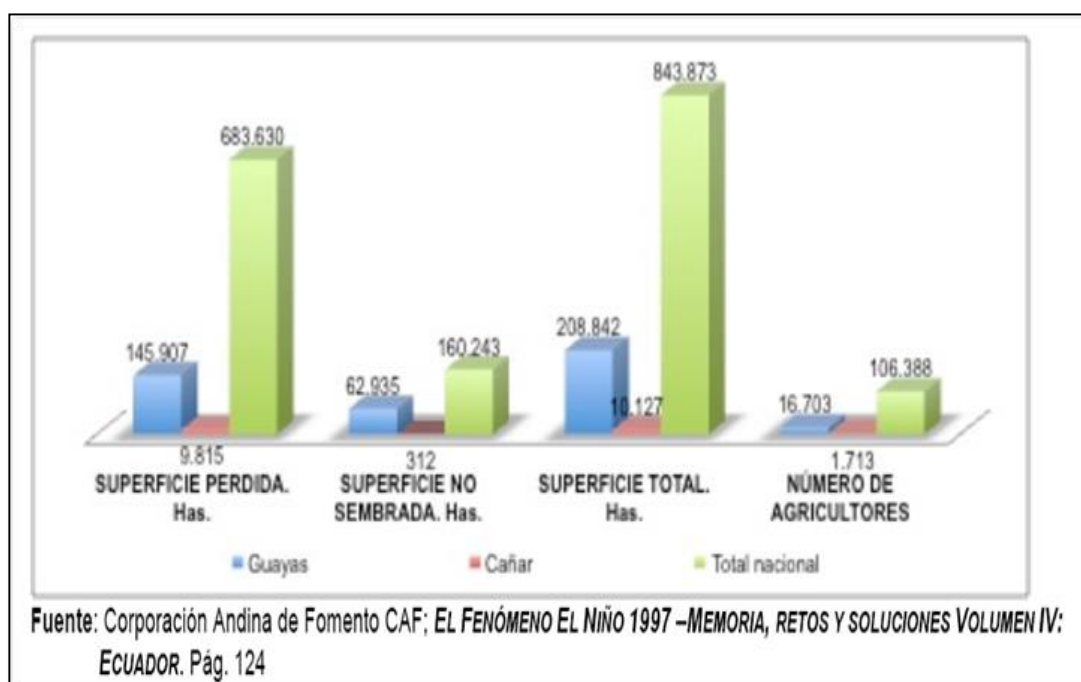
3.1.1 Identification and description of the problem

The Ecuadorian economy in the agricultural sector; is sensitive especially those export products which had effects of the phenomenon of “El Niño” in 1997-98. It damaged and impacted areas with banana and cocoa crops grow; rice, sugar cane and shrimp exports are of high impact on national income and employment generation.

This situation allows us to emphasize the impacts of El Niño in the year 1997-1998 which affected 82.8% of the Ecuadorian coast corresponding to 843,873 ha, of these, 25.75% correspond to the provinces of Guayas and Cañar, located within the area where the Cañar River Flood Control was developed.

Here we can see the impact of El Niño phenomenon in the provinces of Guayas and Cañar.

Figure 3.1 Surface affected by “El Niño” phenomenon



The graph shows that the losses in Guayas and Cañar surfaces are 145,907 and 9,815 hectares respectively, corresponding these to 16,703 farmers in the province of Guayas and 1,713 farmers in the province of Cañar.

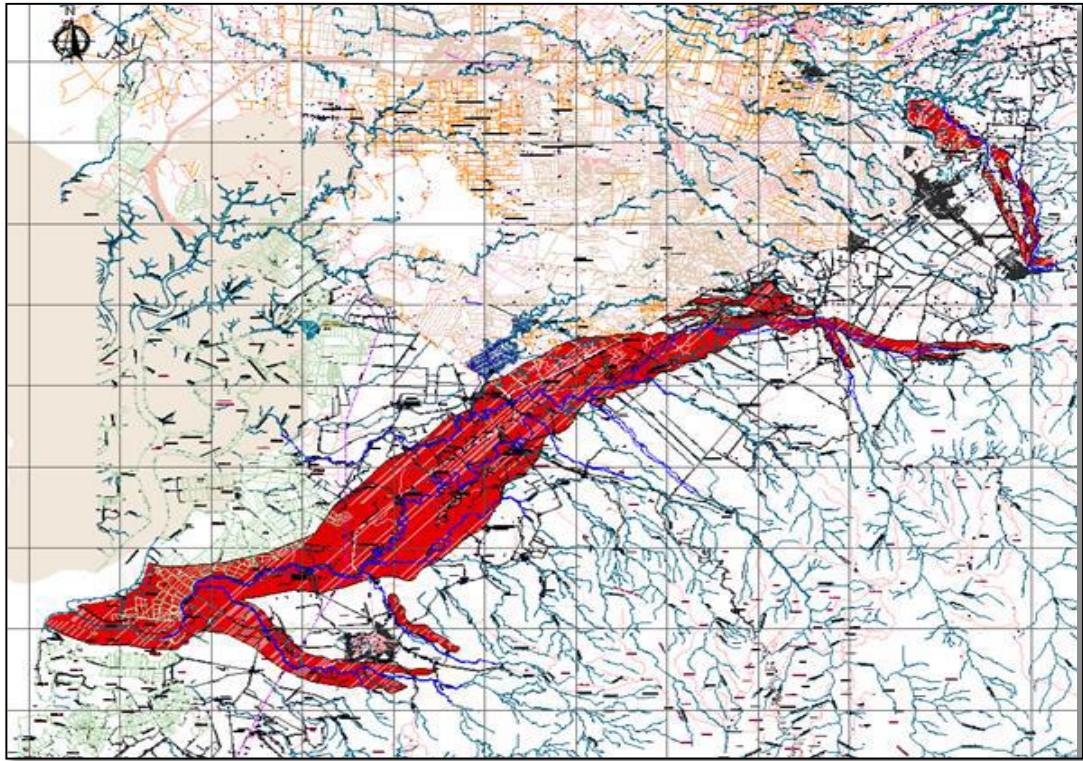
3.1.2 Diagnosis of affected sectors

These are negative impacts caused by the El Niño of 1997-1998. This is an event that occurs in the region cyclically about every 15 years, it had less impact in 2008, 2009 and early 2010. The El Niño should be considered as the cause of the greatest havoc; the floods of 2008 are assimilated to an average year of rain; and those from 2009-2010, years in which the minimum damage occurs.

The localities that flood during the rising of the Cañar River, (2008) represent a total area of 28,701.56 hectares and are as follows:

Cañar River System: Zhucay sectors, La Envidia, Pancho Negro, La Primavera, Barranco Amarillo, Lechugal, Puerto Inca, Las Mercedes, San Juan, San Jacinto, Trapiche, San Agustín, El Carmen, Puerto Envidia, were are primarily grown: Sugar cane, banana and cocoa.

Graphic 3.2 Map of flooded areas in 2008



Elaboration: Asociación Consultoría Técnica – ACSAM Cía. Ltda

- **Damage caused by the 1997-1998 phenomenon and the phenomenon of El Niño in 2008**

There are monetary socioeconomic impacts generated by the flooding in the winter periods of 97-98 years and 2008 that will be discussed. The years 97-98 are considered with strongest winters present with the phenomenon El Niño and the year 2008 as a strong normal winter.

Table 3.3 Damage Produced by El Niño phenomenon in 1998 and La Niña phenomenon in 2008

SECTOR	EL NIÑO PHENOMENON 1997-1998		COMPOSICIÓN PORCENTUAL	LA NIÑA PHENOMENON 2008	
	BULUCA (Millions US \$)			BULUCA (Millions US \$)	
	1998	2010		2008	2010
Housing	5,07	28,80	5,30	12,52	13,42
Education	1,11	6,29	1,16	2,73	2,93
Health	0,62	3,55	0,65	1,54	1,65
Water and Sewage system	0,55	3,15	0,58	1,37	1,47
Electricity	0,57	3,23	0,59	1,40	1,50
Hydrocarbons	0,06	0,34	0,06	0,15	0,16
Road	26,07	148,19	27,25	64,40	69,05
Railway	0,02	0,13	0,02	0,06	0,06
Telecommunications	0,03	0,19	0,03	0,08	0,09
Urban Transportation	0,26	1,47	0,27	0,64	0,69
Agriculture	39,40	224,01	41,19	97,34	104,38
Cattle raising	0,48	2,74	0,50	1,19	1,28
Fishing	1,41	8,00	1,47	3,48	3,73
Industry	5,50	31,28	5,75	13,59	14,57
Trade	1,20	6,83	1,26	2,97	3,18
Tourism	2,32	13,21	2,43	5,74	6,16
Preventions and emerges	10,99	62,48	11,49	27,15	29,11
TOTAL	95,67	543,89	100,00	236,35	253,43

Elaboration: ACSAN consultores

Due to the great importance of the El Niño phenomenon in the Caribbean and Latin American countries, the Andean Development Corporation conducted a study of the implications of this phenomenon on the countries' economies. This information has provided support for estimating damages occurred in Ecuador and therefore; the area of influence of BULUCA Project, for the last registered Niño Phenomenon that occurred between 1997 and 1998.

The values for 1998 were deflated to 2010, using the indices for those years, whereby the damage estimated 2010 prices produced by the FEN 1997-1998 in the area where the projects were developed. In relation to populations and areas, the values for BULUCA Project, which correspond to a much smaller area, resulting in a total lost value of 543'890.000,00 USD in 2010 prices vs the case of La Niña phenomenon that occurred in 2008 and which recorded losses of USD 253'430.000,00 for this area.

Analyzing the damage and loss box, we can see that agriculture is always the most affected area by the phenomenon winters either El Niño phenomenon or normal winter losses they represents 224.01 million dollars in the years 97-98 and 104.38 in 2008, constituting 41.19% of the total damage being a significant figure. This is followed the damage to roads and highways that constitutes 27.25% of the damage with 148.29 million dollars in the year 97-98 and 69 05 million in 2008; housing and industry with 5.30% and 5.75% respectively of total losses amounting to 28.80 million in losses in the years 97-98 and 13.42 million for 2008, 31.28 million during 97-98 and 14.57 million for 2008 in damages to social sectors.

- **Losses in agriculture in 2008**

The following table contains economic losses in agriculture in 2008, where 11,014.83 ha were flooded in the Cañar system. It can be deducted that when flooding occurs there is a loss of USD 28.7 million dollars representing 25% of annual production.

Table N° 3.4 Estimated value of losses – Cañar System 2008

Land use	Area Ha	Cost \$Ha	Cost-affected area (USD \$)
Tropical Arboriculture	992,29	1.000,00	992.290,00
Rice	824,24	3.500,00	2.884.840,00
Banana	1.810,57	7.500,00	13.579.275,00
Shrimp	457,88	4.500,00	2.060.460,00
Sugar Cane	837,32	4.500,00	3.767.940,00
Natural body of water	17,77		0,00
Undifferentiated crops	446,04	1.000,00	446.040,00
Mangrove swamp	58,92		0,00
Cultivated Pasture	5.568,91	900,00	5.012.019,00
Natural Grass	0,89	400,00	356,00
TOTAL SYSTEM	11.014,83		28.743.220,00

Elaboration: Asociación Consultoría Técnica - ACSAM Cía. Ltd

3.2 Actors and economic and technical cooperation agreement

3.2.1 Introduction to the cooperation modalities between the Chinese and Ecuadorian governments.

China cooperation: The Office of Economic and Commercial Counsellor of the Embassy of the Popular Republic of China is the authority for the International Cooperation in Ecuador. All staff is appointed by the Minister of Commerce of China, This is the designated authority to perform agreements and covenants for China in the world, whether they are technical, economic, commercial, investment, repayable loans without interest and non-refundable types.

Between the governments of China and Ecuador there is a basic agreement on Economic, Technical and Scientific issues, signed in 1984; and for each line of cooperation they sign an agreement between the two governments, under preset models for each type of agreement.

China Cooperation runs under four categories: Donations, interest-free credit, concessional loans and scholarships. Resources are allocated each year by the Ministry of Commerce that has signed agreements with the Foreign Ministry, and the amounts depend on the projects which are implemented at a national level.

In the case of donations, the main partners are the SETECI, ministries and GADs. Lines are annually set and Ecuador uses them according to their interests. Under these lines the Ecuadorian government created a list of projects to negotiate. In case of emergencies or disasters, cash resources are sometimes awarded; otherwise, China acquires public works or projects with companies in China and delivers built projects or equipment to the country. Under this modality, the issues depend on the demand but China has emphasis on projects involving direct life population improvement (works, infrastructure and equipment with a focus on social development).

The form of interest-free credit is established through a public bidding process that takes place within Chinese companies. Cash resources are not granted, but works or equipment are; the cancellation period can be ten years or more; for this modality there are defined lines on needs of the Ecuadorian government, -it applies especially to infrastructure projects and more strategic issues.

On the other hand, for the modality of concessional credit, a public tender is not performed. The Ecuadorian institution concerned negotiates directly with the Chinese company with which there is an interest to run a project or work, it is necessary to make a credit application to Eximbank of China (responsible for providing concessional loans). The bank makes a technical assessment of the project and a consultation with the Ministry of Commerce of China to set a credit approval. The main counterparts to the two types of loans are: the Ministry of Finance, Ministry of Strategic Sectors, Ministry of Education, Ministry of Transport and Public Works and Customs Offices. In Ecuador such loans are used to finance beneficial projects such as infrastructure projects (roads, hydroelectric plants, among others).

Finally, with regard to scholarships, the Embassy annually sends a complete list of scholarships granted to the Educational Institute for Student Loans and Scholarships

(IECE). IECE convenes and selects the participants; there is annually a quota of approximately 100 scholarships. These are courses for public workers, from about 20 days to 1 month in China, which is regularly taught in English; these are awarded for different topics such as health, exports and monitoring, security, customs control, among others.

By 2017, there is a prospect of strengthening work with SETECI to choose reserve projects. There is the embassy wellness to plan for a medium term to have a list of eligible projects. (Spain Embassy , 2014)

3.2.2 Economic & technical cooperation between Ecuador and China

The need for changing energy and economic matrix of Ecuador has allowed carrying out several projects that were needed to be funded and supported by the Popular Republic of China. In the case of the Cañar River Flood Control Project, this agreement was acquainted to the National Assembly under Article 418 of the Constitution of the Republic. On November 24, 2009 the Agreement on Economic and Technical Cooperation between Ecuador and China was signed, it give Ecuador a line of preferential credit for an amount not exceeding 330 million RMB yuan with an annual interest rate of 2% within 20 years.

Ecuador and China, with the desire of developing and promoting friendly relations economic and technical cooperation between the two countries, reached an agreement where the project financed by the credit will be evaluated and approved by the Export and Import of China and the Ministry of Finance in Ecuador prior to the agreement of both governments. (Presidencia de la Republica, 2009)

This agreement between the two governments would have an effect through reciprocal communication notes, after the two parties have completed their respective domestic legal process and from the day on which the last Party issues the notice of communication which will run for three years. In the care that the Lender and the Beneficiary fail to sign the agreement for using the Credit within the period stated above, this Agreement shall automatically cease to apply. And if there

should be changes or disputes, they will be resolved through friendly consultations between the Parties. (Asamblea Nacional, 2011)

3.2.3 Participation and contract between SENAGUA and CWE for the construction of the Cañar river flood control project.

Once the preferential credit has been approved by the Bank of Chinese origin and verified by both governments, the project for the construction of the Cañar River Flood Control Project was presented to the Chinese company CWE. The National Secretariat for Water is the responsible institution for supervising and controlling the construction of the project -as states Decree No 1088 that aims to drive processes of water resources management- the work contract expresses: "On one hand the National Secretariat for Water, and the other hand, the company China International Water & Electric Corp. CWE, which is a public company that has among its main objectives the development, hydraulic engineering, hydropower, civil construction projects, irrigation canals, plants, among other areas; sectors that have extensive experience and specific technical and industry knowledge. CWE is represented by its General Representative of CWE in Ecuador, Mr. Zhu Xiao Hua,

Under the current bilateral agreements between the governments of the Republic of Ecuador and the Popular Republic of China, on June 14, 2012 a Memorandum of Understanding between the National Secretariat for Water and the Chinese public company "China International Water & Electric Corp" was signed; whereby the parties agreed to develop activities aimed at mutual cooperation and mutual support, as well as to strength relations between the Republics of Ecuador and China, to achieve the financing, development and construction of Flood Control Projects: Project Naranjal System and Cañar System in the Republic of Ecuador, which is responsible for the National Secretariat for Water in its Annual Investment Plan and Annual Procurement Plan for 2012.

On August 8, 2012 the contract between the National Secretariat for Water and the state-owned PRC, CHINA INTERNATIONAL WATER & ELECTRIC CORP was awarded was the amount of USD 233,000,427.59 and a implementation work term of 36 months.

To implement the agreement, the following guidelines were taken into account:

- It is SENAGUA's function, to be responsible for monitoring the compliance of the contractual provisions by CWE.
- The monitor control will be undertaken directly by SENAGUA or through third parties authorized by them, permanently, about jobs, and construction activities that will make CWE.
- The contract objective is the CONSTRUCTION OF CAÑAR RIVER FLOOD CONTROL PROJECT WHICH IS PART OF BULUBULO CAÑAR - NARANJAL SYSTEM and all the actions that CWE must comply to deliver the works included in the Project properly functioning to the satisfaction of the SENAGUA; it also includes the actions identified in the Environmental Management Plan Project. (Secretaria Nacional del Agua, 2012)
- **SENAGUA Participation**
 - SENAGUA must comply with the obligations stated in the Contract and its documents in a quick and timely manner.
 - It must give CWE the places or the areas where the permanent and temporary contract works will be located.
 - It's SENAGUA function to give attention and solution to problems arising in the performance of the contract in a timely manner, as long as that the solution is their responsibility,
 - It must provide to CWE, the land where the project will be implanted according to schedule.
 - SENAGUA will take care of the land expropriation process and the respective costs for the execution of the relevant works.
 - It must manage legal and administrative proceedings quickly and appropriately before the different government agencies, including the obtaining of the environmental license of the project, as well as the environmental permits and licenses of the cameras, in order to ensure continuity of operation of the Contract: If suspension is produced in

compliance with it by delays or oversights of these procedures, such delays are attributable to the SENAGUA.

- It must provide all the support to ensure the success of the negotiations and the implementation of the work of CWE, including socialization and implementation of plans for community relations in the area of influence of the project.
- It is the obligation of SENAGUA to timely designate both the Control and the Contract Administrator.

3.2.3.1 Participation and contract between SENAGUA and Cañar Consortium for the Cañar river flood control project construction

- **Cañar Consortium partnership**

Consulting services to be contracted have the general aim to Control building works under the Cañar Flood Control System, forcing the consultant to take responsibility for compliance with the technical, social, environmental, economic and legal aspects that the Contractor Construction must meet; in order to deliver to the National Water Secretariat the work under strict accordance with the Construction Contract, to the technical specifications, drawings, change orders, ancillary contracts and other documents, making sure that they are executed within the schedule, ensuring efficient and safe operation of the works.

Within the audit contract between the National Secretariat for Water and the Cañar Consortium that is conformed by EMPRESA PÚBLICA UCUENCA EP, ACSAM CONSULTORES CIA LTDA and CONSULTORIA TECNICA CIA. LTDA, on agreement was signed on December 12, 2012 to provide consulting services and audit Construction work of the Cañar River Flood Control Project to be executed by the company China CWE, worth USD 9,167,872.95 for a period of 36 months. (Secretaria Nacional del Agua, 2012)

- **Participation of Consortium Cañar**

In accordance with what is established in the provisions of the Agreement No. 039 CG dated November 16, 2009, "INTERNAL CONTROL STANDARDS FOR COMPANIES, PUBLIC SECTOR INSTITUTIONS AND LEGAL PERSONS OF PRIVATE LAW HOW HAVE PUBLIC RESOURCES" issued by the General State Comptroller, the specific objectives of auditing among others are the following:

- The consortium should monitor and respond on the implementation of construction contracts, in order that the works are executed according to the standards of the best engineering practices and according to their final designs that include technical specifications, construction drawings, working programs, recommendations for designers and other technical standards.
- It should inspect and detect the flaws and oversights in the final designs, providing solutions to conflict situations that may occur within the established framework and take immediate steps to situations that require changes.
- The consortium should propose to the administrator of the contract, changes and adjustments to the designs that they consider necessary for the proper functioning of the works, indicating the changes that may occur in the budget, schedule and scope of the contract.
- The Consortium should report on design changes proposed by CWE.
- The Consortium must perform work control programs, framed within the overall construction program presented by CWE and duly approved by the National Water Secretariat.
- The Inspector will monitor these programs, both physical and economic progress of each activity initiated by CWE as well as the set of material resources, labor and equipment. It will verify the objects achieved, compared with those offered in the proposed construction.
- The consortium must ensure that the equipment used by CWE is suitable and sufficient for the proper performance of works.
- It must verify and monitor the capacity and efficiency of the staff involved in the builder in the general work and on every front specifically.

- The consortium must ensure that the materials supplies and their use in the work fulfill the requirements of the technical specifications, ensuring excellent product quality.
- The consortium should provide systematic, clear, concise and comprehensive reports to the National Water Secretariat so that it is always informed of the progress of works and the problems encountered in the construction of the Project.
- The consortium has to obtain and process statistical information on personnel, materials and equipment as well as weather conditions, labor times, strikes, problems encountered and any factor or event related to project implementation.

CHAPTER IV

EVALUTION, IMPACTS AND EFFECTS

4.1 Summary of environmental impacts and risks

4.1.1 Preliminary environmental management plan

The Environmental Management Plan is focused on activities and works implementation in order to prevent, mitigate and rectify the impacts and environmental effects, caused by the implementation of the project in its different phases (construction, removal, operation and maintenance).

4.1.2 Environmental management plan objectives

A series of environmental measures have been established, to be applied through various institutional mechanisms. These environmental measures are reflected in the following specific objectives:

- To design environmental measures for the construction phase, according to the negative impacts of higher hierarchy environmental involvement.
- To establish environmental measures to be developed during phases of operation related to the optimization of the positive impacts of the project.
- To propose environmental management mechanisms that minimizes environmental impacts that may be generated during the project implementation.
- To minimize environmental impacts on the physical, biotic and socio-economic components that could be generated during the execution of dredging.
- To develop sub-plans or environmental programs based on the provisions of various laws and regulations.
- To keep a sub-plan or monitoring program and evaluation of environmental measures and to set prevention levels.

4.1.3 Matrix of the environmental impacts

In the Table No 4.1 it's presented the matrix of positive and negative environmental impacts that have been identified along with the measures to take to prevent and correct them.

Table No. 4.1: Matrix of the environmental impacts

	IMPACT IDENTIFIED	EXTENT OF CONTROL AND PREVENTION
1	Alteration of the channels of streams and rivers	Daily monitoring of the banks will continue to warn the occurrence of accelerated erosion; in case of occurrence, stop working.
2	Changes in the baseline water quality	Water quality result of the samples will be compared to the baseline from the nearest site where sampling was performed.
3	Loss of topsoil erosion and consequences	If there is erosion on riverbanks, it will proceed with the reshaping of the slopes of the banks to a stable angle will proceed.
4	Impact on soil quality	To prevent the loss of organic soils (agricultural, reforestation), the layer of soil will be removed with machinery, collected in appropriate places and when the hydraulic filling is completed, will be positioned as a top layer and leave ready for reforestation.
5	Impact on archaeological sites	To establish procedures and activities aimed at the preservation of cultural, archaeological and scientific heritage, located in the area of direct influence of the works at Cañar Water system flood control Project

6	Generation of noise and vibration	It shall be ensured that the noise level do not exceeds 115 DBA; otherwise the equipment will be stopped in order to correct the problem.
7	Emission of gases	In case of default in the regulated levels, Environmental Monitoring will request the reprogramming for an early maintenance of equipment and necessary measures to reduce emission levels (measured in fuels or incorporating elements to reduce emissions).
8	Crops and wild flora damage	It must be strictly necessary to remove the topsoil to adapt the sediment disposal sites. The topsoil (organic soil and vegetation) should be removed stockpiled for later use in revegetation work
9	Impact on wildlife	The dredging of the banks will be the strictly necessary in order to lessen the effect on macro-benthic fauna
10	Alteration of landscape quality	Once the withdrawal of equipment, machinery or installations of a site or area is made, it will proceed to verify that the place is clean and similar to the pre-occupation or according it's stated in the authorization documents of such spaces.
11	Alteration of the quality of life and well-being of surrounding communities to the works	When the use of space is required, the inspection will be made with the owner, the scope of work will be explained, a photographic record of the "current state" will be risen; preventive measures will be implemented, compensatory measures will be defined if the case warrants, and an authorization document will be underwrite with the registered measures and agreements. Usually for private treatment, it is better to do it privately in conjunction with a local government representative who can explain the benefits to the community and help to obtain authorization.

12	Interferences in public services	In case of public infrastructure (eg. Street lighting) it shall be notified about the work to the perpetrator, specifying the activities and requesting a review by a technical entity.
13	Damage to the existing infrastructure	If it is required to move billboards or minor infrastructure, the owner will communicate the need to perform this activity.
14	Protests and citizenship opposition to the route of the bypass	During project implementation, the population and private entrepreneurs in the area of influence of this project have an efficient channel to present their questions, complaints, claims, etc., and efficient mechanism for remediation of damages.
15	Lower incomes by reducing crop areas due to the expropriation of land.	Just compensations to the affected population by the Project works, according to the established culture (during the study phase) and the surface condition.
16	Risk of accidents to third parties for the use of vehicles and heavy machinery.	Bimonthly distribution of posters in the areas of influence of the project, including information on project activities, timelines, progress, project safety standards, etc. For care and people's prevention.
17	Labor accidents	The staff is trained on the possible risks and the preventive measures to be applied to prevent occupational hazards.
18	Soil contamination by improper disposal of solid waste	There is an area disposed for temporary storage of waste providing storage facilities located on level ground, separated from facilities, airy and has an area of at least 4 x 4 m.
19	Reduction of floral and faunal species	Previous work it should be verified that there is no presence of wildlife nearby; in case there is, it should be transferred to a neighbor area. The presence of the biologist will be important for the withdrawal of amphibians, snakes and mammals that are along the zone of influence of the work. All product of clearing or cutting

		branches will be taken to a temporary storage area when completed the hydraulic fill, they will be cut and spread on the ground to encourage reforestation work
20	Proliferation of vectors, insects and diseases	Appropriate measures will be taken, spraying, and anti-proliferation disease plan will be notified to the health center of the area in case of mishaps.
21	The Churute ecosystem due to constructive discharge process of Estero Soledad Grande and the operation of the Bypass.	No dredge will be done nor will the ecosystem -formed by mangrove- be modified in any way.
22	Job creation and demand for services	Training and posters about the project will be given to villagers and farm owners
23	Increased quality of life for flood control.	Training and posters about the project will be given to villagers and farm owners
24	Control of runoff on the slopes of the protection works with topsoil and grass	Training and posters about the project will be given to villagers and farm owners

Report the author

4.1.4 Environmental costs of the Cañar System

The summary of environmental costs, generally correspond to conditions of good construction practices, so their costs are included in the budgets of construction or in the operational phase and are presented in the table below:

Table No 4.2 Budget for the Environmental Management Plan

BUDGET FOR THE ENVIRONMENTAL MANAGEMENT PLAN	
PHASES	TOTAL USD
Qualifying Phase Costs	12.187.903,97
Construction Phase Costs	859.625,92
Operational and Maintenance Phase Costs	39.565,70
Withdrawal Phase Costs	51.461,47
Total	13.138.557,06

Source: Summary of environmental costs of the Cañar System. Studies for the Cañar River Flood Control Project

4.1.5 Environmental impact analysis of the Bypass Cañar project, Estero Soledad Grande and Reservoir La Lagartera

The bypass control project would have a length from birth (Hacienda La Grecia, Province of Cañar) to hit the road Guayaquil-Machala it's of an approximate 16.8 km and 300 meters wide.

The purpose of the bypass is to divert water from the Cañar River in the winter season to prevent this to overflow in winter season and thus, protect the villages and surrounding communities living near or next to the river; also, to protect their crops and homes that every year are most affected. In the same way, just as in summer, in times of water scarcity, this bypass is intended to store water, in order to help farmers and ranchers in the area to be provided by water and avoid crop losses.

This work will be of greatest impact because it will be necessary to expropriate areas of crops and because of the use of machines that alter soils and vegetation of the area, being the area of influence of 507.09 hectares of which 285.28 hectares are fallow, 39.00 hectares are banana, 72.72 hectares correspond to rice crops, 49.06 hectares of shrimp pools, teak and watermelon affected in 10.58 hectares, 40.00 hectares of sugarcane plantations and a total of 9.86 hectares of affected routes.

In the area of the reservoir La Lagartera, the most affected crops are of sugarcane with 303.76 hectares of expropriations, followed by 90.48 hectares of grown grass,

rice crops constituting 56.38 hectares and 10.87 hectares of banana crops have been expropriated.

The discharge from the channel goes from the Guayaquil-Machala road, and will be diverted to the Estero Soledad; this section has a length of 7.52 km and 300 m wide; the area occupied by this part of the project is 226 30 hectares; the total area that would be affected is 267.39 hectares, of which 47% related to 125.96 hectares of the area is comprised of low vegetation (scrub), 34% - 89.94 hectares are mangrove; and 10% in total 28.15 Hectares will affect shrimp ponds and different short-cycle crops such as rice and cocoa.

Mangrove affectation represents an area of 89.84 hectares from which only 3% of the total reserve is part of the mangrove, it means that 8 Hectares would be within the limits of Churute Mangroves Ecological Reserve and Estero Soledad.

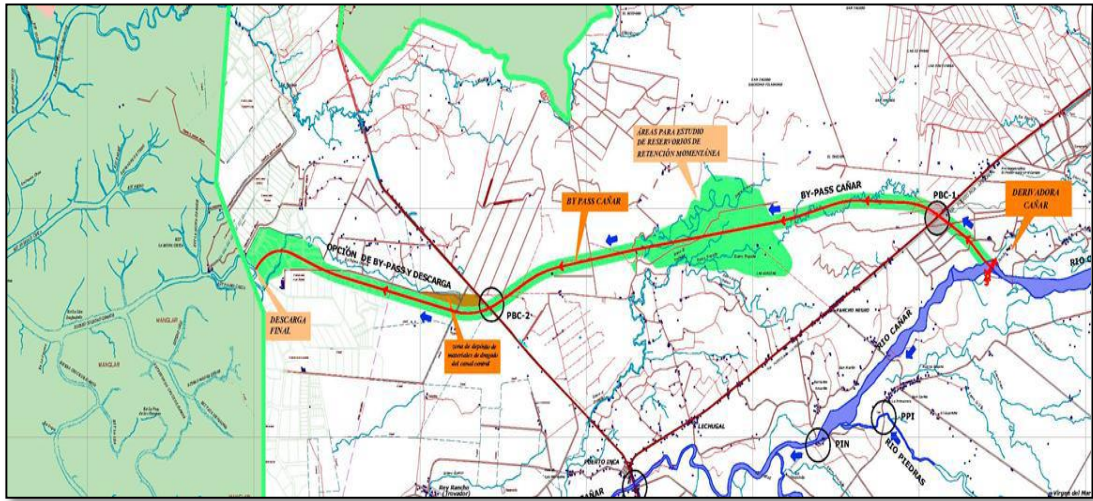
The expropriated land for use or development of the project comprises a total of 1235.97 hectares.

Table No 4.3: Expropriated Hectares

BYPASS CAÑAR		SOLEDAD GRANDE		RESERVOIR LA LAGARTERA	
LAND USE	AREA	LAND USE	AREA	LAND USE	AREA
Fallow	285.28	Rice/cocoa	23.48	Sugar Cane	303.76
Banana	39	Mangrove	89.84	Cultivated Grass	90.48
Rice	72.72	Shrimp	28.15	Rice	56.38
Teak	2.09	Vegetation	125.92	Banana	10.87
Watermelon	8.49				
Lake	49.06				
Sugar Cane	40.59				
Road	1.9				
Dirt Road	4.87				
Paved Road	3.09				
Total	507.09	Total	267.39	Total	461.49

Report by the author

Table No 4.4: Bypass Cañar (Green shadow) Faunal survey Area.



Elaboration: Asociación Consultoría Técnica-ACSAM

4.1.5.1 Animal species in the influence area

During studies in the influence area, 83 individual species of wildlife were identified within the faunal study.

- The birds recorded a total of 53 species of which 25 species are common, 9 species are less common, 7 species are frequent and 5 are rare;
- 15 species of mammals; 8 common species, 5 less common species, 1 common and 1 rare.
- 9 species of reptiles, all of these are native.
- 6 species of amphibians from when 1 specie is named bullfrogs.

Within the area of influence Cañar Bypass, a total of 72 animal species were obtained.

- The group of birds recorded a total of 44 species (20 uncommon species, 7 very common, 9 less common, 5 frequent and 2 rare).
- Mammals with 14 species (7 common species, 5 less common, 1 frequent and 1 rare)
- Reptiles with 8 species (all native)
- Amphibian with 6 species (5 native and 1 introduced).

4.1.5.2 Endangered Species

The populations of some mammal species as cabeza de mate and tigrillo are in decline, due to decomposition of the habitat; poaching especially affects tigrillos for their fur or for considering it as a threat, while the population of armadillos is increasing, and the guanta and guatusa population remains stable despite the villagers consider them as food source.

The area of influence of Cañar Bypass was where more number of animal species were found because it contains more diverse ecosystems, composed mainly of rice fields, banana plantations, cocoa crops, small forests and wetlands.

4.1.5.3 Flora and fauna species in danger or violated

Environmentalists carried out samples of plant species from different sections of the works, none of which is in a category of endangered, however, the Mangrove Blanco and Mangrove Jeli, are part of vulnerable species for the decline of their wild population.

4.1.5.4 Endangered species

Populations (*Rostramus sociabilis*) and the (American Choroceryle) are possibly threatened by the decreasing habitat due to banana crops, cacao crops and shrimp ponds that occur in the sector, but not because of the influence of the project construction.

4.1.6 Conclusions

According to environmentalists studies and reports of in the area of influence and operations of the project, the route of the Cañar Bypass from inception to exit the Guayaquil / Machala way, does not affect relevant vegetation or forest species that are endangered or threatened. The route of Cañar Bypass, for the most part, will affect most of the parts of grassland areas, floodplains and short-cycle crops.

In the terrestrial part to the height of the route Guayaquil / Machala, the project does not affect Churute Mangrove Reserve; none of the four types of forest land reservation will be impacted by the action of the project.

Cañar natural river discharge has caused over time:

- Floods that damaged the small short-cycle crops, and houses of the inhabitants of Puerto Envidia.
- Erosion of the riverbed.
- Crop land loss ponds and change in the mangrove structure.
- Clogged streams.
- Hardening of soil
- Fishing decrease.

These impacts are natural and common in the mouths of rivers.

In the Bypass discharge it was found that:

- At the end of the discharge area Estero Soledad Grande, there are red mangroves of over 30 meters high and 40 cm wide over 100 years old, the reports have not reported damage to the mangrove ecosystem after Bypass construction.
- Pumping stations will allow estuarine waters to easily come and it will allow shrimp farm to take advantage of this resource.
- The vicinity of the Estero, the mangrove condition is good, waterfowl are seen, and artisanal fishing is practiced, no impacts or changes are noticed.

At the construction stage, the main impact seen from the environmental point of view will be the clearing of mangrove. Preventive measures will be taken into account in order to not alter it significantly his immediate reforestation, even after the works.

Along the Bypass it is expected that the major environmental impact on the operational stage is created by sedimentation, for which they must take the necessary precautions, such as monitoring water and the use of dredging when it is required.

4.2 Socio economic impact analysis of the project construction.

In the present study, the current situation of the population is analyzed in the area of direct influence of the project, in different parishes and communities from the area facing the annual problems caused by floods; and how this project benefits or affects them from a socioeconomic point of view. In the following study, a description of various aspects will be presented, which reflect the situation faced in terms of size of population, employment, economic activity, education, health, and safety issues.

- **Population Distribution by Area and Gender**

In the study area, the parishes that conform the area of direct influence affected by the project are part of the canton La Troncal (Pancho Negro) and Naranjal (Jesus Maria, San Carlos, Santa Rosa de Flanders); according to the last census of the year 2010, the total population is 27,041 inhabitants, of which the parish Pancho Negro shows a tendency of significantly growth 8.94% which is higher than other parishes. It surpasses twice the growth of the area of influence; in general it is a region with high rates of population growth, the parish that grows at a slower rate is San Carlos with 2.08%.

Table No 4.5: Population of the direct area of influence

PARISHES	2010			GROWTH RATE
	Men	Women	Total	
Jesús María	3.486	2.941	6.427	2,64
San Carlos	3.530	2.986	6.516	2,08
Santa Rosa De Flandes	2.917	2.527	5.444	3,34
Pancho Negro	4.702	4.312	9.014	8,94
Total	14.635	12.766	27.401	4,35

Elaboration: Asociación Consultoría Técnica - ACSAM Cía. Ltda.

Source: INEC. Population Census 2001 y 2010

- **Economically active population by economic sectors**

Representative economic activities of the area of influence are those related to the primary sector, secondary and tertiary; in following table it can be seen each economic activity and which sector it belongs to:

Table No 4.6: Economically active population of Cañar System

SECTOR	ACTIVITY
Primary	Agriculture, livestock, forestry, fishing
Secondary	Manufacturing industry, electricity, gas, steam and air conditioner, water supply, sewerage and waste management
Tertiary	Wholesale and retail

SECTOR	PANCHO NEGRO	JESÚS MARÍA	SAN CARLOS	SANTA ROSA DE FLANDES	TOTAL
PRIMARY	1.969	1.681	1.837	1.424	6.911
SECONDARY	501	128	105	63	797
TERTIARY	624	488	442	385	1.939
NOT SPECIFIED	197	173	169	209	748
NEW WORKER	41	58	39	38	176
TOTAL	3.332	2.528	2.592	2.119	10.571
PERCENTAGE					
PRIMARY	59,1	66,5	70,9	67,2	65,4
SECONDARY	15,0	5,1	4,1	3,0	7,5
TERTIARY	18,7	19,3	17,1	18,2	18,3
NOT SPECIFIED	5,9	6,8	6,5	9,9	7,1
NEW WORKER	1,2	2,3	1,5	1,8	1,7
TOTAL	100,0	100,0	100,0	100,0	100,0

Source: INEC. 2010. Population Census

Elaboration: Asociación Consultoría Técnica - ACSAM Cía. Ltda.

According to the results of the population census of 2010, the economically active population is mainly concentrated in the primary sector, in fact 65% of the population perform economic activities related to agriculture and livestock; Pancho Negro reaches 59%, parish Jesús María the 66.5%, San Carlos the 70.9% and Santa Rosa de Flanders 67.2%.

About 18% of the population work in related activities with the tertiary sector; in this branch of activity it is important the activities of wholesale and retail. It is also important the proportion of the population engaged in manufacturing in Pancho Negro, this represents 15% of it.

- **Activity Levels by Agricultural Sectors**

After identified that the primary duties are the main source of work in the project area, it was found that agriculture is the most common activity in the area. According to the information available at ACSAN Consultant in the area of influence of the project, the major productions generated are bananas, followed by cocoa, rice and sugar cane.

Table No 4.7: Summary of annual agricultural incomes in the project area 2008

AGRICULTURAL SECTOR	INCOME (US \$)	PERCENTAGE
Banana	201.645.990,00	63,77%
Cocoa	58.492.800,00	18,50%
Sugar cane	4.974,049,10	1,57%
Rice	51.108,000,00	16,16%
Total	316.220.839,10	100,00%

Elaboration: Asociación Consultoría Técnica - ACSAM Cía. Ltda.

In the Table No 4.7 is presented an estimate of the revenue generated in 2008 by the agricultural sector of USD 316 million; certainly the main crop in the area is banana, which contributes with 63.7% of the income; cocoa production contributes with

18.5%, 16.16% corresponds to the production of rice and marginally 1.6% comes from sugar cane production.

With these data and the situation analysis of the population and the agriculture sector in the project area the Flood Control Project will be analyzed.

- **Research**

The research was conducted in the cantons La Troncal and Pancho Negro parish in the province of Cañar and in parishes and communities Barranco Amarillo and Puerto Inca in the province of Guayas, being these, the areas of influence of the project.

To conduct this research, the book "Research Methodology" of Sampieri, has been studied. It states that a good data collection is needed in order to make a good research. (Roberto Hernandez Sampieri, Carlos Fernandez Collado, Pilar Baptista Lucio, 2006)

Therefore, the types of research chosen were descriptive and field research. Descriptive research because it is important to describe the situations and conditions of the variables to present a report on how the population lives, and field research because besides the secondary data obtained by entities that perform work on the project, it is important to get primary information for the evaluation and the contribution of the respective study.

Based on the formula for getting the sample according Sampieri, the universe of a population of 50,126 inhabitants which is directly or indirectly affected by the construction work; a sample of 381 people was obtained to be interviewed, mostly farmers and people living in the general area.

- **Sample population:**

In the study area various surveys to villagers were conducted. Most of the populations surveyed were men. There is a difference of almost 5% more male than female respondents as shown in the following table:

Table No 4.8: Interviewed Population in the area of influence of the project

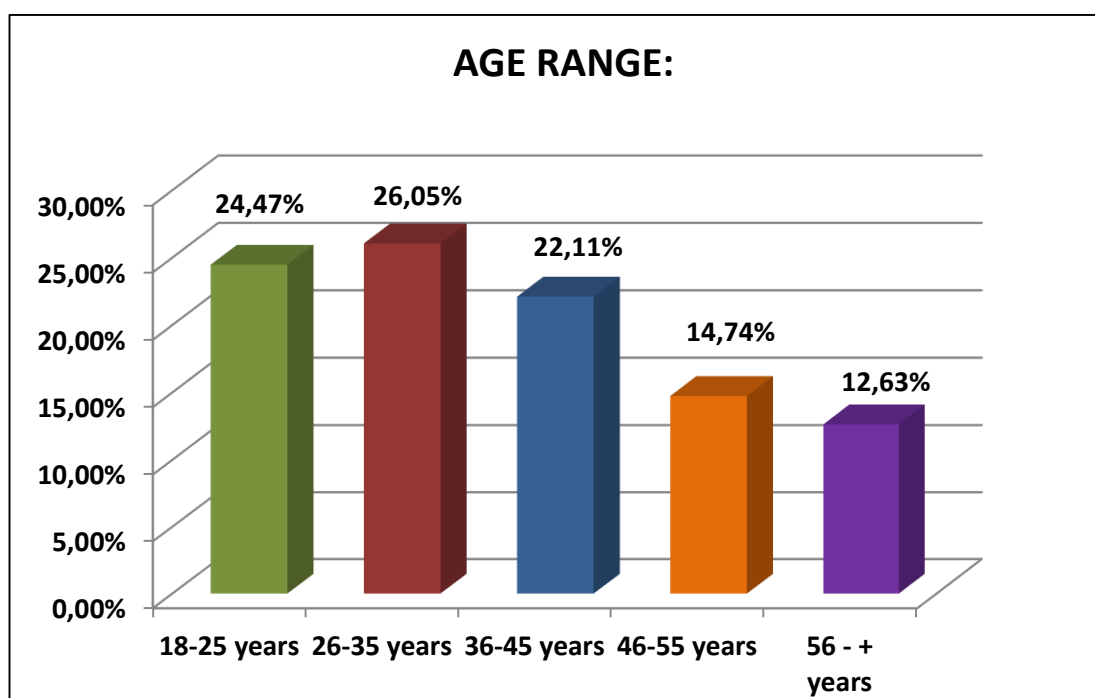
POPULATION:	RESULTS	PERCENTAGE
Men	199	52.37%
Women	182	47.63%
TOTAL	381	100.00%

Report by the Authors

a. Population age range of surveyed.

Surveys were done in a population of economically active age of 18 years old and onwards. As a result, there is a population mostly young, over 72% of respondents are between 18 to 45 years old.

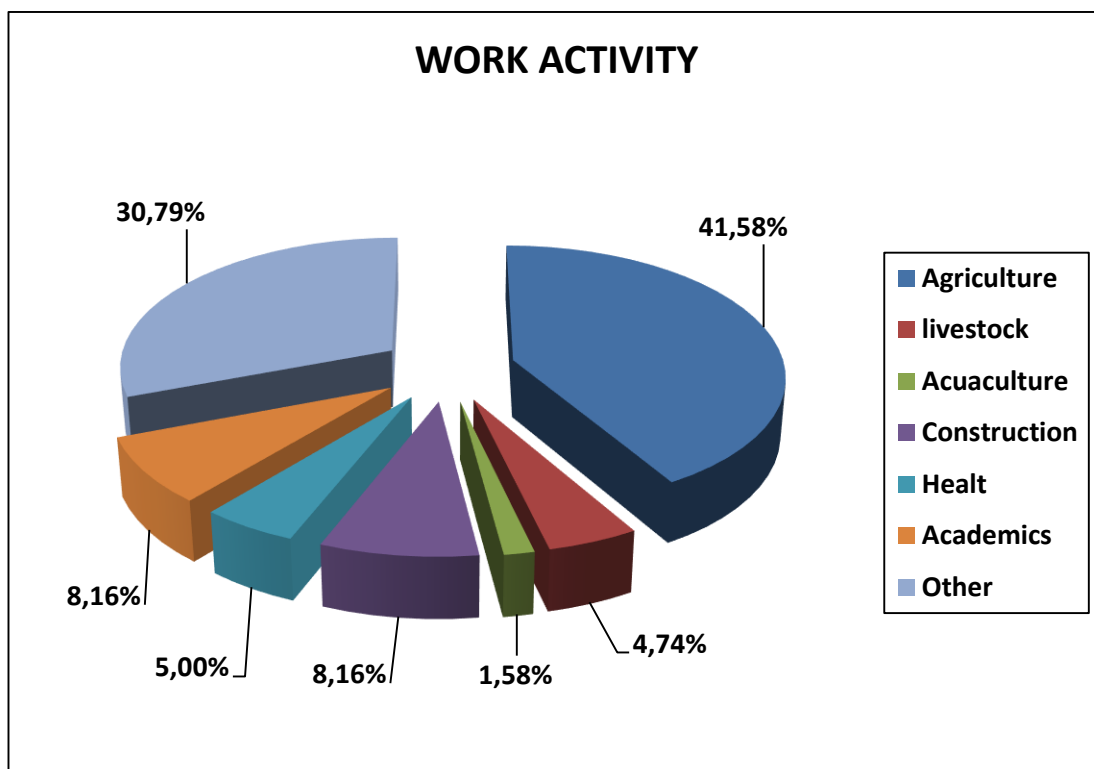
Graphic No: 4.9: Sample age range



Report by the Authors

b. Work Activity.

Graphic No: 4.10: Work Activity of the sample

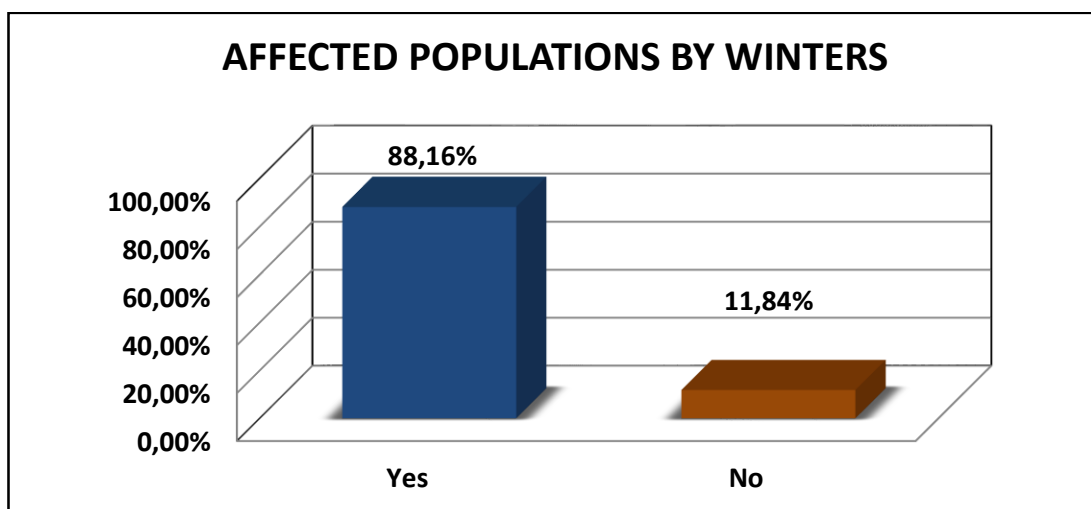


Report by the Authors

As it is seen in the data provided by the Consulters ACSA, agriculture is the main source of income in the area where the Flood Control Project is developing. Likewise through surveys applied to the population, the same result was evident constituting 41.58% of the respondents engaged in agriculture and 30.79% are engaged in other activities, such as housework, being still mostly women who are engaged in this activities.

c. Affected population and damages by winters

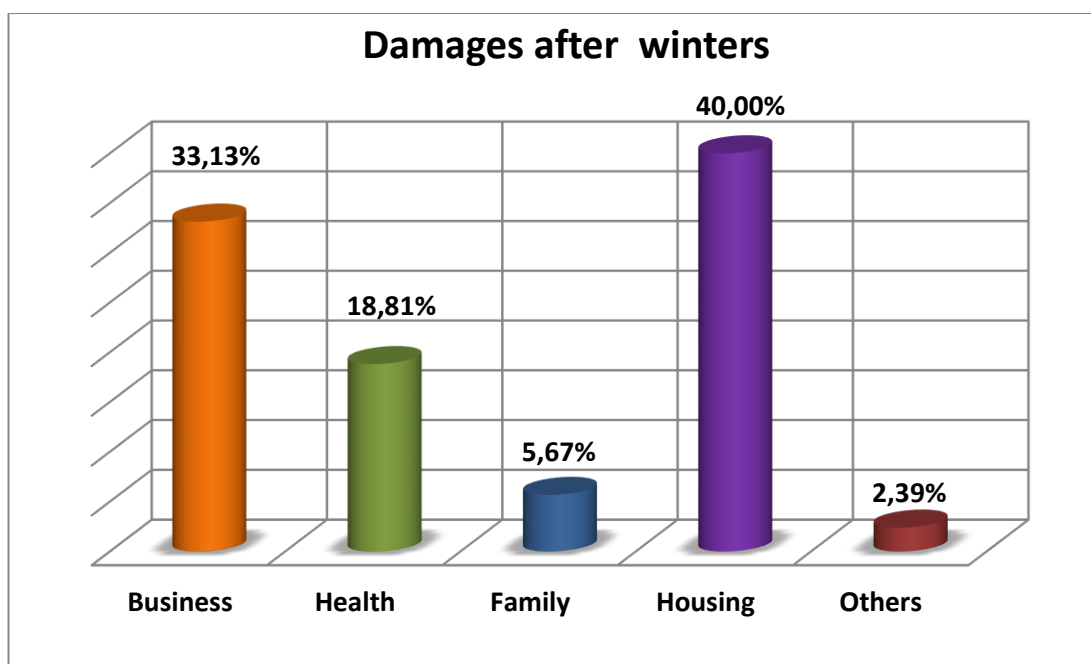
Graphic No: 4.11: Affected population by winters



Report by the Authors

The results of the survey give a clear answer about the effects caused by the rains; the 88.16% of the survey claimed to have been affected by El Niño winters or previous years being overwhelming and disturbing; only 11, 84% of respondents denied this, then we see how they were affected.

Graphic No: 4.12: Damages after winters.



Report by the Authors

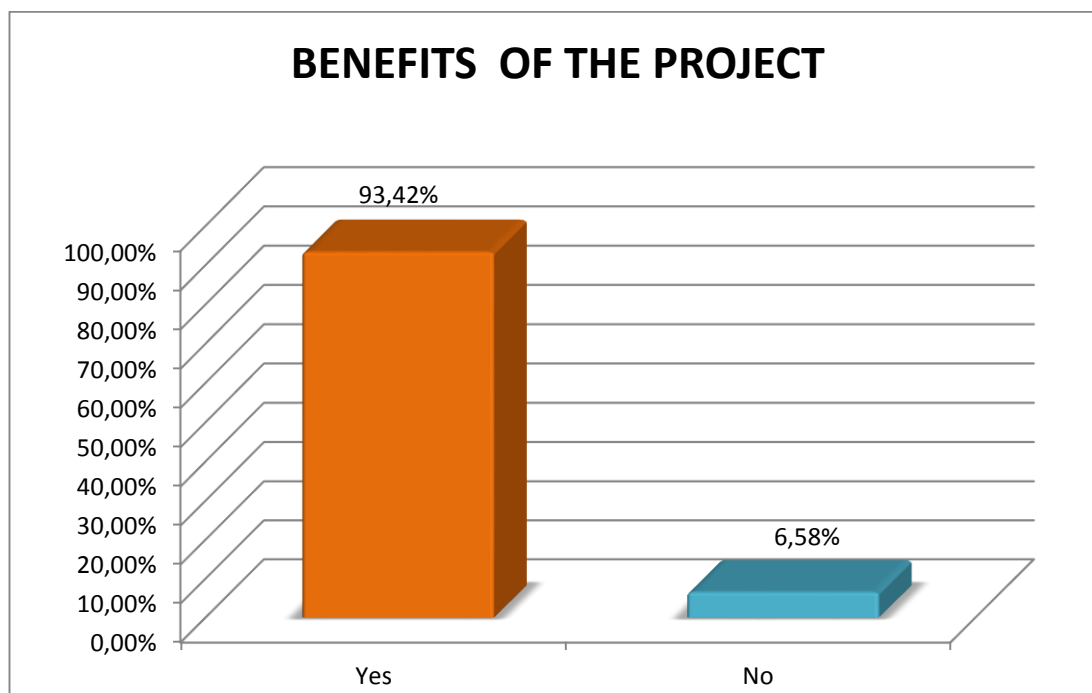
This graph allows to see that people were most affected at their houses with 40% damages and in a large percentage health affected with 18.81% damages, constituting these two variables almost 59% involvement. This shows that despite being the agriculture industry the most affected with economic losses, people living in the area of the project were more affected at their houses and health. Since most of the people are only employees of farms where banana, cocoa, etc. are produced, they are not the farms owners, businesses according to the surveys were affected in 33.13%

This variable allows understanding why people who claimed to be affected in their health and their housing project say the flood control project will indeed benefit them.

d. Benefits of the Flood Control Project

The results of the survey show a clear trend of what people think about Cañar River Flood Control Project. 93% of people surveyed said the project would benefit them personally and the 7% believe that the project does not benefit them personally.

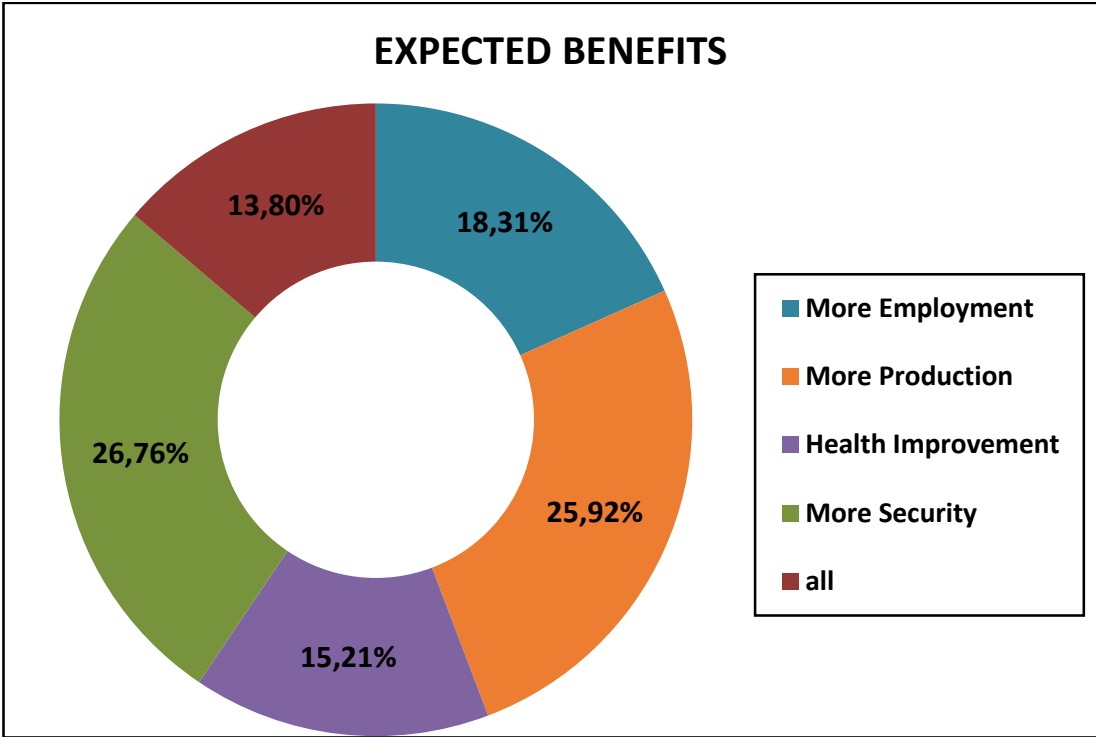
Graph No: 4.13: Benefits of the Project



Report by the Authors

From this percentage, people assure that this project will provide them security, production, employment and protect their health; people can support that what they need is to feel safe from the strong winters; 26.7% of respondents believe this, followed by wholesale production and employment with 25.9% and 18.3% respectively, 15.2% believed that it will protect their health and to all this a 13% is added which ensures that the project will provide benefits in all aspects.

Graphic No: 4.14: Expected Benefits



Reports by the Authors

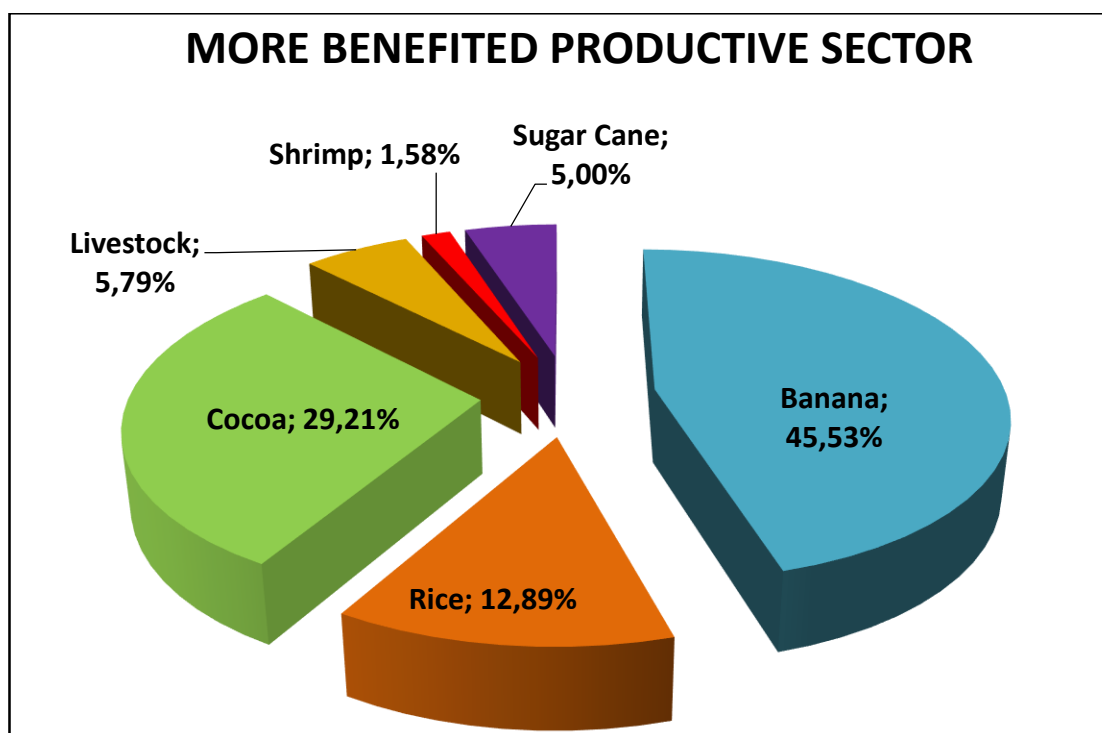
e. More Benefited Productive Sector

After obtaining information about what are the most important agricultural activities in the area, using the data provided by the Consultora ACSAN, the surveyed population were asked to give their opinion about what they think will be the more benefited productive sector by the Flood Control Project.

Respondents claimed that banana production will have higher returns of 45.5%, as this is a product that needs a lot of water and there are the many banana plantations in the area; followed by cocoa with 29% of surveyed, rice with 13% although this

productive sector also requires a lot of water and is very important in the domestic industry has no appeal as the banana industry and the cocoa industry in the area, a marginal livestock of 6%, sugar cane 5% and 2% for the shrimp sector as they are products that are not produced in large quantities compared to the first one.

Graphic No: 4.15: More Benefited Productive Sector

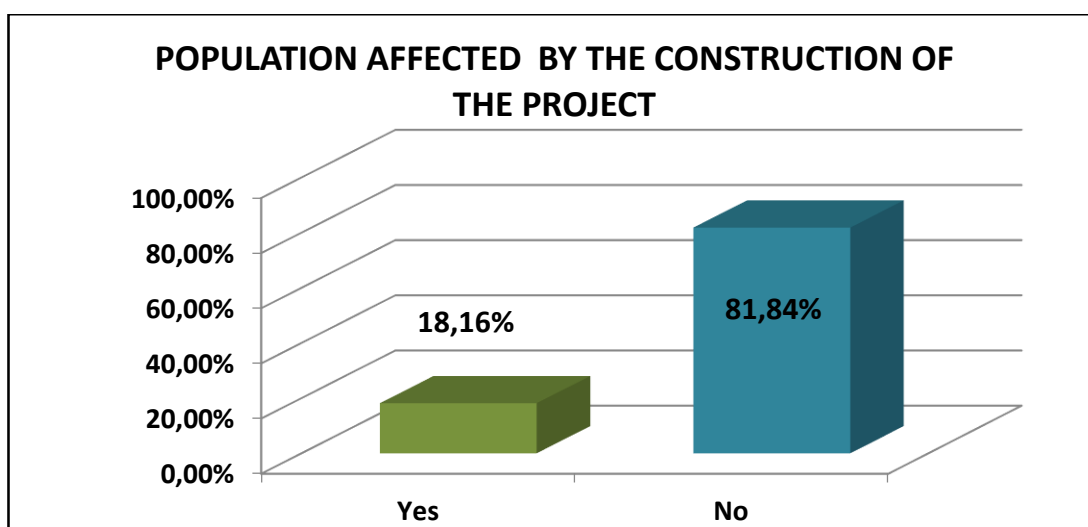


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f. Population Affected by the construction work

In the survey, populations were asked to analyze if they have had any impact or effects caused by the construction of the project. People answered in an 82% that they did not feel any impact or effects caused by the construction of the Flood Control project, while 18% reported being affected by the work done in the area.

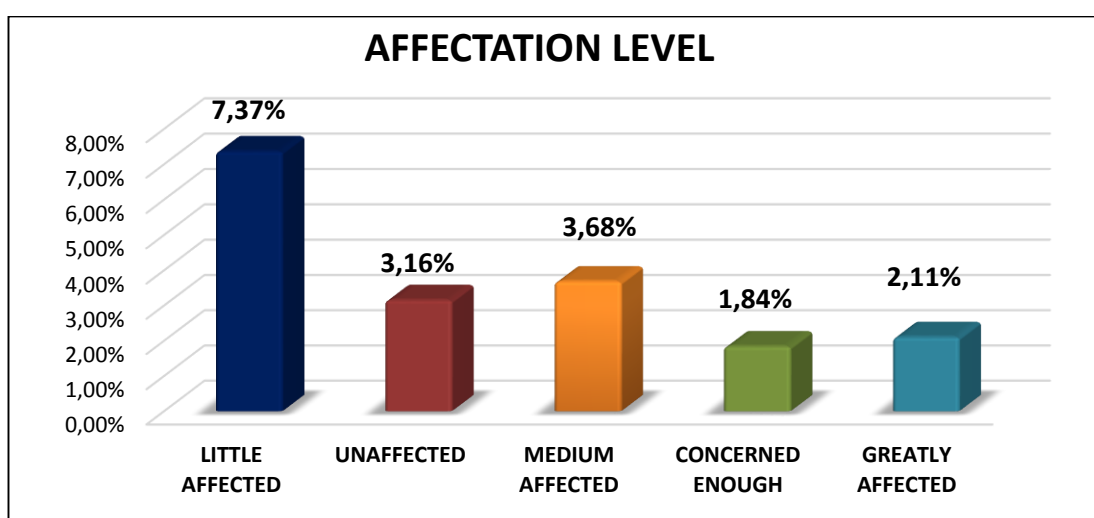
Graphic No: 4.16: Population affected by the construction of the project



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The 18% of the affected population were asked in what magnitude they were affected. 7.3% answering that were little affected, 3.16% were unaffected, 3.6% were moderately affected and by 1.8% and 2.1% who were very concerned and very affected by the construction of the project. In other words the impact generated by the project works have had minimal involvement in the population, being the discomfort of the affected population, the dust and noise generated by dump trucks and lorries transiting near populated areas and in a small proportion, people who claimed to have been affected by not being canceled the value of the land expropriated.

Graphic No: 4.17: Affectation Level

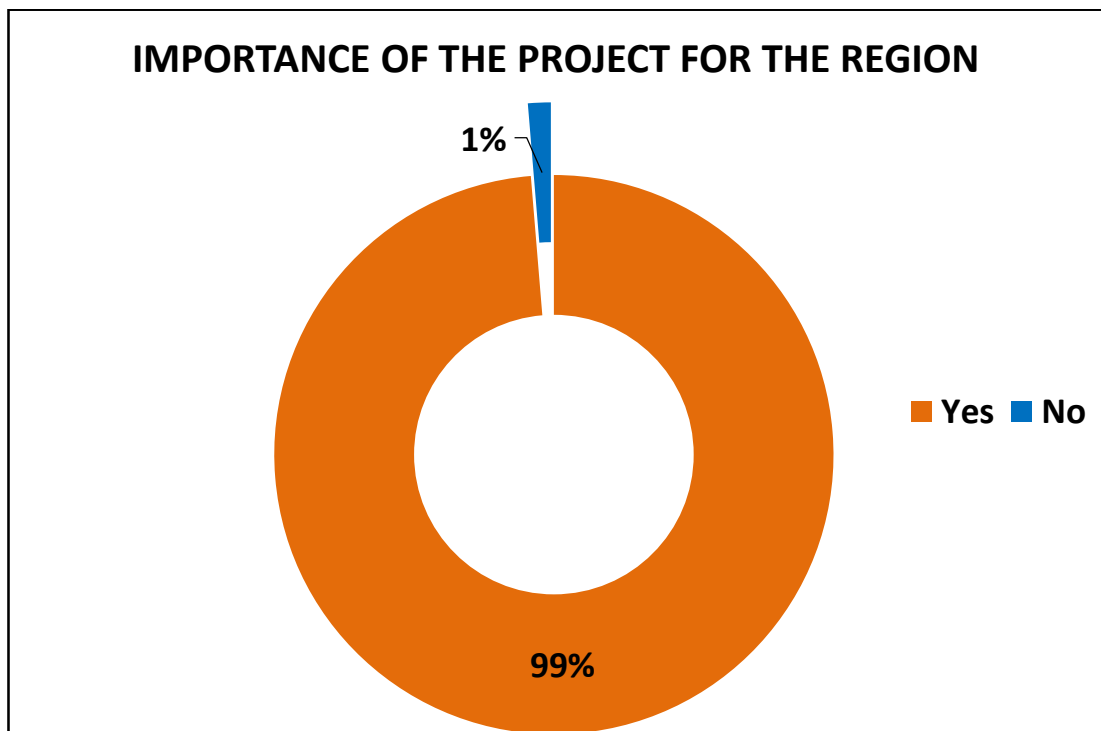


Reports by the Authors

g. Importance of the Project for the Region.

Although in surveys there were people who said the project would not provide them personal benefits, they assure that the project was important for the development of the region. As it can be seen in the following graph 99% of the respondents think that the project is important for the region and only 1% of the population surveyed believes that this project is not important.

Graphic No: 4.18: Importance of the Project for the Region



Reported by the Authors

4.3 Conclusions:

As one of the conclusions about this field study in the field, I believe that the information collected is helpful to assess the need and satisfaction of the population by the construction of this project as expected by many decades of suffering and losses not only material but also of victims affected by harsh winters in this area.

As it was discussed above, the Cañar River Flood Control Project, plays a fundamental role in the security of people, the owners of land with crops mostly affected live in cities but not in the areas where the floods occur, while the farm workers are those who live in the area where all the damages occur; In this case the project will mainly provide protection to the human factor and will help production and employment generation, which will allow growth and development of the area, bringing hundreds of people out of poverty and underdevelopment in which they live and filling with new opportunities for their improvement.

4.4 Benefits of the project construction in the area of influence.

4.4.1 Expected benefits

For methodology purposes for assessing benefits, by assessing expected but avoided damages, such damages become the project's benefits. In the case that the project works would avoid 100% of the damages, all the previous values will become benefits, but if the coverage or level of protection is partial, then these values should affect the degree of protection.

For a better understanding of what is started above, there is the following example: If the expected damage would be of 100 and a work that is built prevents 80% of the damage, then the benefit obtained with the work is 80, because the 20% remaining proceeds to be damaged despite the construction of such work and there will be no benefit at that percentage; it means that, by comparing the damage which is then converted to the benefit without the work, the harm after the work built, compared to the benefit obtained with the construction of the project is 80%. That is why this approach is called "avoided damage", since only the damage that is avoided with the project works, become to be considered on benefit.

Table No: 4.19 Protected and unprotected areas estimation for the Project zone

Type of Year	Statistics	% Total Protection
Type 1	# FEN Strong(>1800mm)	70%
Type 2	# Strong Winters (1200- 1800 mm)	80%
Type 3	Normal years (600-1200mm)	90%
Type 4	Dry Years (<600 mm)	95 y 98%

Elaboration: Equipo Consultor de Hidrología, 2011

As it's shown, it has been established 4 types of years differentiated according to the expected amount of rain and, consequently, depending on the areas of flooding that is expected to occur for few days due to atmospheric phenomena, so the percentage of Total Protection is expected.

For example, in a critical year when a strong phenomenon of El Niño occurs, with rainfall of over 1,800 mm in the year, it is estimated that the protected area by the work will be 70%; without the work an area of 56000 hectares will be affected, but with the work operating, only 16800 hectares would be affected and 39200 would have been protected.

El Niño phenomenon of 1997 is considered type 1, while the winter of 2008 is considered type 2; taking this case as the example, it can be the possible benefits taking as a reference the damages caused in the winters of 1997 and the year 2008.

Table No. 4.20: Socio-economic Sectors, Affectations and Benefits

Sector within 56400 hectares affected	EL NIÑO TYPE 1	Expected Benefits 70% of Protection	STRONG WINTER TYPE 2	Expected benefits 80% of Protection
	1997-1998		2008	
	(Millions US \$)		(Millions US \$)	
Housing	28.8	20.16	13.42	10.736
Education	6.29	4.403	2.93	2.344
Health	3.55	2.485	1.65	1.32
Water and sewage	3.15	2.205	1.47	1.176
Electricity	3.23	2.261	1.5	1.2
Hydrocarbons	0.34	0.238	0.16	0.128
Road	148.19	103.733	69.05	55.24
Railway	0.13	0.091	0.06	0.048
Telecommunications	0.19	0.133	0.09	0.072
Urban Transport	1.47	1.029	0.69	0.552
Agriculture	224.01	156.807	104.38	83.504
Livestock	2.74	1.918	1.28	1.024
Fishing	8	5.6	3.73	2.984
Industry	31.28	21.896	14.57	11.656
Trade	6.83	4.781	3.18	2.544
Tourism	13.21	9.247	6.16	4.928
Prevent and emergency	62.48	43.736	29.11	23.288
TOTAL	543.89	380.723	253.43	202.744

Elaboration: Equipo Consultor de Hidrología, 2011

The benefits, for the year 1997-1998 with El Niño event and a protection of 70%, a profit over USD 380 million was estimated in the whole area of the Buluca system. In winter 2008 event type 3, the profits would have USD 253.43 million dollars.

To make an estimation of the value of losses per hectare, it was taken as a reference the losses value divided by the number of hectares affected in the case of the phenomenon of El Niño in 1998, where 56,400 hectares were affected and there was an estimated value of USD 543 888 667 million, which gives us a value of USD 9712 per hectare in damages, this we will replicate by different years.

Table No.21: Damages value per hectare and type of year.

Concept	Year Type			
	1 El Niño 1997- 1998	2 Strong Winter 2008	3 Normal Years	4 Dry Years
Total Affection (US \$ year 2010)	543'888.667	253'430.476		
Areas (Hectares)	56.400	31.760		
Average value of damages transformed into benefits (US \$/hectare)	9.712	7.980	8.846	6.556
Protection %	70%	80%	90%	95% y 98%

Elaboration: Equipo Consultor de Hidrología, 2011

4.4.2 Project Effectiveness

In the case of CAÑAR System, which is the subject of this study, when we multiply these areas by the average values of damage per hectare in the previous table, the annual value of damage for each year is obtained. For example, by 2015, in the following table, the flood area is 15,500 hectares, and corresponds to a type 3 year average damage which, at market prices, is USD8.846 per hectare; then the total damage in the year is $15,500 \times 8,846 = \text{USD}137'111.811$ (for the approximation of cents on the unit price). The same procedure is followed for each and every one of the years of 2015-2030.

Estimated flood areas are data that was provided by Consultora ACSAN through studies conducted by the consultant team of Hydrology, in 2011; Based on these data it is possible to see the damage and estimated benefits for each year up to a period of 30 years depending on the type of year that is presented; It is presented below a matrix of the harms and benefits by year and type of winter.

Table No: 4.22: Flooded areas vs Protection factor and estimated benefits

Years	Flooded Area (Hectares)	Estimated Damage Without Work	Protection Factor	Estimated Benefits With Work
2015	15,500	137,111,811	80%	109,689,449.01
2016	4,900	32,124,087	98%	31,481,604.93
2017	15,500	137,111,811	80%	109,689,449.01
2018	6,080	39,860,091	95%	37,867,086.64
2019	11,900	94,956,633	90%	85,460,969.71
2020	6,080	39,860,091	95%	37,867,086.64
2021	6,080	39,860,091	95%	37,867,086.64
2022	4,900	32,124,087	98%	31,481,604.93
2023	6,080	39,860,091	95%	37,867,086.64
2024	11,900	94,956,633	90%	85,460,969.71
2025	6,080	39,860,091	95%	37,867,086.64
2026	4,900	32,124,087	98%	31,481,604.93
2027	6,080	39,860,091	95%	37,867,086.64
2028	25,600	248,634,819	70%	174,044,373.37
2029	15,500	137,111,811	80%	109,689,449.01
2030	4,900	32,124,087	98%	31,481,604.93

Elaboration: Equipo Consultor de Hidrología, 2011

The benefits are equivalent to the damages multiplied by the factor of protection. For example for 2015, the protective factor for type 2 year, as it has been listed by hydrological series, is 80%. Then, by multiplying the total profits of USD 137'111.811 by 0.80, we obtain benefits derived from the project that prevent 80% damage concerning USD 109'689.449.

This appraisal of the benefits has been done in pessimistic terms, since the floods caused by rain falling directly on the land and not by overflowing rivers is temporary, lasting a few days, until the river levels drop and the drainage system that

the project has, allow the evacuation of standing water; it means that benefits may be higher than those calculated.

4.4.3 Benefits generated by the project

By having the value of costs per hectare and the cost of damages in 2008, we can estimate the benefits generated by the project to the most affected productive sectors in the area of direct influence. The estimated values are the following:

Table No. 4.23: Benefits that The Project will generate

Land Use	Area (Ha)	Cost Usd \$/Ha	Cost-Affection (Usd \$)	Estimated Benefits
Tropical Arboriculture	992,29	1.000,00	992290	793832
Rice	824,24	3.500,00	2884840	2307872
Banana	1.810,57	7.500,00	13579275	10863420
Shrimp	457,88	4.500,00	2060460	1648368
Sugar Cane	837,32	4.500,00	3767940	3014352
Natural Water Body	17,77			
Undifferentiated Crops	446,04	1.000,00	446040	356832
Mangrove	58,92			
Cultivated Pasture	5.568,91	900,00	5012019	4009615.2
Natural Grass	0,89	400,00	356	284.8
TOTAL SYSTEM	11.014,83		28743220	22. 994576

Reported by the Authors

Considering 2008 as a year of type 2 -strong winter, a protection factor of 80% is estimated, with the benefit of almost \$23 million in the total agricultural sector of the area where the Flood Control Project is developing, the affecting costs are \$28,743.220 million -speaking in terms that the project doesn't exist; however, the operational work benefits are estimated at 22,994.576 million for the agricultural production sector.

4.4.3.1 Operation and maintenance costs

The operation and maintenance costs were estimated and developed thanks to the research of hydraulic and electro-mechanical groups of the Association. Estimates of values for an average year, type 3, corresponds to a value of USD2'382.343.83 while for a year type 2 would be \$ 7727.015 million.

For the following years considering the next 15 years from the 50 years of useful life the same outlined criteria was used for estimating the benefits; it means, this cost may increase or decrease depending on the calculated flooded areas.

The lifetime of the equipment is estimated for 15 years so that by 2028 the maintenance costs of the work will be USD 17 million.

4.4.3.2 Benefit Costs

Analyzing the costs and benefits the investment costs plus the damage caused on the years of construction of the work; have been taken as a reference. In those years no costs are generated by maintenance with the exception of 2015. For the remaining years it is taken as a reference the maintenance costs less the expected benefits considering as a reference the type of wintry year.

The feasibility of the project will be analyzed in the table below.

Table 4.24 Costs and Benefits of the work

Year	Investment Cost	Maintenance Cost	Damages Per Years	Benefits	Cost-Benefit
2012	9,577,701.76		39,860,091		49,437,792.8
2013	78,491,268.22		94,956,633		173,447,901.2
2014	85,257,156.85		39,860,091		125,117,247.9
2015	61,713,403.26	1,250,116.04	137,111,811	109,689,449.01	49,226,161.8
2016		7,727,015.16	32,124,087	31,481,604.93	23,754,589.8
2017		5,000,464.16	137,111,811	109,689,449.01	104,688,984.9
2018		765,221.24	39,860,091	37,867,086.64	37,101,865.4
2019		2,107,290.35	94,956,633	85,460,969.71	83,353,679.4
2020		765,221.24	39,860,091	37,867,086.64	37,101,865.4
2021		765,221.24	39,860,091	37,867,086.64	37,101,865.4
2022		7,727,015.40	32,124,087	31,481,604.93	23,754,589.5
2023		765,221.24	39,860,091	37,867,086.64	37,101,865.4
2024		2,107,290.35	94,956,633	85,460,969.71	83,353,679.4
2025		765,221.24	39,860,091	37,867,086.64	37,101,865.4
2026		7,727,015.40	32,124,087	31,481,604.93	23,754,589.5
2027		765,221.24	39,860,091	37,867,086.64	37,101,865.4
2028		11,938,022.32	248,634,819	174,044,373.37	162,106,351.1
2029		5,000,464.16	137,111,811	109,689,449.01	104,688,984.9
2030		17,303,484.24	32,124,087	31,481,604.93	14,178,120.7

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The cost generated by the project vs the profit that will generate in the future shows that the project is entirely feasible because it will protect the region in a large extent. Taking data from the first 15-year life of the project's construction phase in the investment and maintenance costs; it is possible to see that a total of USD 307.5 million will be invested vs USD 895.4 million in benefits for the entire production and population sector.

5. CONCLUSION.

The Cañar River Flood Control Project is a clear example of an International Cooperation for the Development, seen in its various forms of Technical and Economic Cooperation, as it involves different social and economic fields and we can be said that the majority of the population of Cañar river basin is involved in this megaproject.

Cooperation between Ecuador and China, taking into account the specific case of this project, has been a successful so far because they have met the objectives since the beginning of the agreement between the involved parties. As usual, there will always exist obstacles, but the project has come forward with optimism and credibility of many people in order to improve the living conditions and safety of thousands of people who for decades waited for this moments to feel the satisfaction and security with their work and their property, which, usually in an instant was affected by winters.

The pessimism of many people has been seen when they thought that investing in this type of projects was not viable and that the cost was going to be very high. I think that when this project is fully performed and starts to show the results of the investment, this is going to be reflected in the benefits that will annually generate, not only in a considerable improvement in production, but will generate more jobs, and this will allow people to develop, not only economically but also in having a better quality of life, health and wellness.

During this thesis I have shared the pain and suffering of many people in the affected area for losing their properties and beloved ones. Sometimes we do not realize the seriousness of the phenomena of El Niño and the heavy winter rains that hit the shores. This project has generated great expectations among the population and only the time will tell if both efforts and determination paid off, since the project is to be opened in early 2016 and still accurate data on the true extent of this work cannot be generated as the weather is completely changing.

However due to this study, I am filled with optimism and confidence that this project will generate and overcome the expectations from the first day of work, confidence and commitment have been put out of this project.

In the first chapter, we developed the history of international cooperation in its principles and how it is changing over the course of time, its different forms and by different interests. Likewise, it has been analyzed the income of Ecuador in International Cooperation as a country seeking support from the international community for their different purposes, and how the understandings were with the Chinese government to reach agreements that are developed today in our country.

The second chapter was focused on the objectives and legal part of the project, on how the law protects the construction of the work and what are the main objectives that support the work.

In chapter three, it was possible to see the situation in which people live every year and how losses of the productive and social sector are generated; that situation does not allow the proper development of the region. In this chapter, it was also analyzed the international agreements between the Chinese government and the Ecuadorian government in order to carry out important facts as financing, construction and development of the work, through a line of credit through the Export-Import Bank of China. The interesting thing about this type of agreement is to see that China gives credit at low interest but seeks that all works are developed by companies from China, being a type of technical and economic cooperation.

The last chapter of this work is focused on analyzing the social and economic impacts the project would generate in the population and the productive sector and could be concluded that the population is desperately seeking a solution to the problem affecting every year their crops and their homes, which makes them vulnerable to these situations year after year.

As I said before, the people living in the area are employed by the farm owners but not the owners themselves; for this reason at the time of interviewing people, what they most expected was that the project will benefit their safety.

There is too early to determinate with numbers the benefits this project is generating, however we started seeing that the project is accomplishing with the expectations, since the arrival of the rains season at the beginning of this year are testing this big project. We can see that zones that in other time easily flood, now are protected, this project besides giving great economic benefits, it will also provide security in the region where works on the project are nearly completed in order to give a new hope to many people after so many years of wait.

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7. APPENDIX

- CUESTIONARIES