UNIVERSIDAD MAYOR DE SAN ANDRÉS

FACULTAD DE HUMANIDADES Y CS. DE LA EDUCACIÓN

CARRERA DE LINGÜÍSTICA E IDIOMAS

Traducción Escrita Español-Inglés, de artículos del Programa de Doctorado "Ciencia y Tecnología del Medio Ambiente" y de artículos científicos de proyectos de investigación de la Dirección de Postgrado e Investigación Científica de la Universidad Técnica de Oruro

Trabajo Dirigido para obtener el Título de Licenciatura

Por: MARÍA EUGENIA MALDONADO VALLEJOS

Tutora: Lic. Virginia Coronado

LA PAZ- BOLIVIA

2012

UNIVERSIDAD MAYOR DE SAN ANDRÉS
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CARRERA DE LINGÜÍSTICA E IDIOMAS

Written Spanish-English Translation of the documents of the Department of Postgraduate Studies and Scientific Research (DPIC) at the Técnica de Oruro University (UTO)

Supervised Work to obtain the Licenciatura Degree

By: MARÍA EUGENIA MALDONADO VALLEJOS

Tutor: Lic. Virginia Coronado

LA PAZ - BOLIVIA
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Presentada por: Univ. María Eugenia Maldonado Vallejos

Para optar el grado académico de: **Licenciatura en Lingüística e Idiomas**

Nota numeral: ……

Nota literal: ……

Ha sido ……

Director de la Carrera de Lingüística e Idiomas: Lic. Virginia Coronado Conde

Tutor: Lic. Virginia Coronado Conde

Tribunal: Lic. Freddy B. Sepúlveda Tapia

Tribunal: Mg.Sc. Javier Taborga M.

This work is dedicated to my parents, brothers, uncles, grandfather and beloved friends, who supported me, took care of me, and most of all, loved me.

"Sometimes our hearts get tangled
And our souls a little off-kilter
Friends and family can set us right
And help guide us back to the light."
Sera Christann

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I offer my regards and blessings to my beloved friends, Gisela and her whole family, and Lourdes (Glup), whose advice and support are inestimable.

Thank you all for supporting me in any respect during the completion of this work.

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RESUMEN

El presente reporte hace referencia a las actividades llevadas a cabo en el trabajo dirigido *Traducción Escrita Inglés-Español, Español-Inglés, de Artículos del Programa de Doctorado "Ciencia y Tecnología del Medio Ambiente" y de Artículos Científicos de Proyectos de Investigación de la Dirección de Postgrado e Investigación Científica (DPIC) de la Universidad Técnica de Oruro (UTO).* Éste trabajo está relacionado con la traducción de documentos del DPIC del español al inglés. Además de la traducción, se desarrollaron otras actividades aplicando el conocimiento de traducción y haciendo las competencias de traducción más fuertes. En los siguientes párrafos se explica brevemente las actividades realizadas.

En el Capítulo I, se explican las actividades realizadas por el Departamento de postgrado e investigación científica. Además, se identifican las necesidades de apoyo y se describe el problema.

El Capítulo II consiste en la propuesta de trabajo. Además, en él se consideró la justificación, los objetivos, los indicadores, y la estrategia de acción, que engloba el análisis del texto fuente, los métodos y las técnicas de traducción, el estudio de las técnicas, el estudio terminológico, las herramientas y el plan de acción.

En el Capítulo III se presenta el desarrollo de la propuesta. En él se detallan el cronograma de trabajo, la secuencia de actividades, los logros y las experiencias. Dentro de la secuencia de actividades se identificaron tres etapas. En la etapa uno se consideran el análisis del texto, la traducción del primer borrador y la selección de términos específicos; en la segunda etapa, se detalla la revisión y corrección y la edición del texto; y en la tercera etapa, se presenta el estudio de las técnicas de traducción y el estudio terminológico.

En el Capítulo IV, se explican los resultados. El Capítulo V incluye las conclusiones y recomendaciones. Finalmente, se adjunta la bibliografía y los anexos. Los anexos presentan cuatro partes, Textos de origen y de llegada, Técnicas de traducción, Análisis terminológico y Terminología.

ABSTRACT

The present report makes reference to the activities carried out in the Supervised Work *Written Spanish-English Translation of the documents of the Department of Postgraduate Studies and Scientific Research (DPIC) at the Técnica de Oruro University (UTO)*. It is concerned with the translation of Spanish documents into English of the DPIC. Besides the translation, some other activities were developed applying the translation knowledge and making the translation competences stronger. In the following paragraphs, the activities carried out are shortly explained.

In Chapter I, the activities carried out by the *Department of Postgraduate Studies and Scientific Research (DPIC)* are explained. Additionally, the Needs of Support are identified and the problem is also described.

Chapter II consists on the Work Proposal. Besides, there were considered the Justification, Objectives, Indicators, and the Strategy of Action, which embraces the Analysis of the Source Text, Translation Methods and Procedures, the Study of the Procedures, the Terminological Study, the Tools, and the Plan of Action.

Chapter III stands for the development of the proposal. The work schedule, the sequence of activities, the Achievements and the Experiences are detailed in it. Inside the sequence of activities, three stages are identified. In the first stage the Analysis of the Text, the Translation of the First Draft and the Selection of the Specific Terms are considered, in the second stage, the Review and Correction and the Edition are detailed; and in the Third stage, the Translation Procedure Study and the Terminological Study is presented.

In Chapter IV, the results are explained. Chapter V includes the Conclusions and Recommendations. Finally, the bibliography and the annexes are attached. The annexes present five parts, the first presents the report of the Institution, the second shows some pages of the source and target texts, the third present the translation procedures chart, the fourth contains the terminological analysis, and the last offers the Terminology.

WRITTEN SPANISH-ENGLISH TRANSLATION OF THE DOCUMENTS OF THE DEPARTMENT OF POSTGRADUATE STUDIES AND SCIENTIFIC RESEARCH (DPIC) AT THE TÉCNICA DE ORURO UNIVERSITY (UTO)

INTRODUCTION

Nowadays, English language is very important all around the world. Updated information is more likely to be found in this language, and for the non-English speakers it has become a boundary to improvement. The *Department of Postgraduate Studies and Scientific Research* (DPIC)[1] aims to break this boundary, therefore improving and updating professionals in Oruro City.

The *Department of Postgraduate Studies and Scientific Research* is a branch of the *Técnica de Oruro University*[2], which offers different Diploma, Mastery, and PhD courses to improve the academic level of the students and professors. In May, 2009, a PhD course in the Environmental area was initiated in co-operation with the Technical University of Berlin. The course was named *Ciencia y Tecnología del Medio Ambiente*[3] and started with twenty-four professionals, most of them University Teachers.

[1] Dirección de Postgrado e Investigación Científica (DPIC)
[2] Universidad Técnica de Oruro (UTO)
[3] Environmental Sciences and Technology

The PhD professors are German people who do not speak Spanish and the PhD students do not speak German; hence, English language was established as the communicating language of this course in order to make easier the interaction between students and teachers. However, the main problem with this is that most of the students do not know English. Besides that, the Department also required the translation of some of their projects to deliver them to international institutions. Therefore, a translator was needed to overcome this language boundary by developing a Spanish – English written translation of the students' thesis profiles and the Department's scientific documents.

Therefore, with an agreement between the *Department of Postgraduate Studies and Scientific Research* and the *Department of Linguistics and Languages*, of the *Mayor de San Andres University*, a translator was sent to the *Department of Postgraduate Studies and Scientific Research* in order to overcome this difficulty. The translator was in charge of translating the documents, as well as of correcting and editing the source documents.

All the work was carried out from January 25th to August 27th 2010 in the office of the DPIC. Applying the acquired knowledge in the *Department of Linguistics and Languages*, we, the translator, were able to correct and edit the Spanish documents in order to translate them into English. As the source documents were related to Scientific Knowledge, it was necessary to recognize the technical terms from the Engineering areas. With this process, the Terminological analysis was carried out. Besides, an analysis of the used translation procedures was developed.

By the end of this work, we not only contributed with the interaction between the PhD students and Teachers, but also developed a Terminology

of the technical terms in order to provide the PhD students, the *Técnica de Oruro University* Students in general, and the students of the *Department of Linguistics and Languages* of the *Mayor de San Andres University*, with some knowledge that could be helpful in their academic education.

CHAPTER I

DEPARTMENT OF POSTGRADUATE STUDIES AND SCIENTIFIC RESEARCH

1. ORGANIZATION

The *Department of Postgraduate Studies and Scientific Research* (DPIC), a branch of the *Técnica de Oruro University,* is an institution that depends directly on the Vice-Rectorado. It was created on January 9th, 1999 by resolution of the University Council Nº 02/99. Currently, the office of the Department of Postgraduate Studies and Scientific Research is located on the third floor at the *Paraninfo Universitario* Building.

The objectives of the creation of this department were the following: To increase the qualification of the human resources with the highest academic level by providing updated training and improving the Diploma, Speciality, Mastery and PhD courses. All of these postgraduate courses and scientific researches are focused on the solution of regional and national problems and are aimed at making possible their spreading and publication.

For achieving its objectives, the Department has signed many agreements with different universities and some international institutions. The agreements were made in order to update postgraduate courses and develop activities of Environmental Remediation. Some of the mentioned agreements were signed with the following institutions and universities:

- *Program of Strategic Research in Bolivia* (PIEB[4])
- *Polytechnic School of the Litoral* (ESPOL[5]) from Guayaquil, Ecuador
- *Tarapacá University of Arica* (UTA[6]) from Chile
- *Nacional del Altiplano Puno University* (UNAP[7]) from Peru
- *Technical University of Berlin*, Germany
- *Polytechnic University of Catalunya* (UPC[8]) from Barcelona, Spain
- *Polytechnic University of Madrid* (UPM[9]), Spain

The courses provided by the *Department of Postgraduate Studies and Scientific Research* were addressed to university teachers and other professionals interested in the areas. Some of the courses that were organized are the following[10]:

- *Mastery in Business Management*
- *Mastery in Project Management*
- *Mastery in Audit and Financial Management*
- *Mastery in Livestock Activity – Milking Area*
- *Mastery in Livestock Activity – Animal Production*
- *Mastery in Private Law*
- *Diploma Course in Procedural and Criminal Law*
- *Diploma Course, Specialty and Mastery in Higher Education*
- *Diploma Course in Constitutional Law*
- *Diploma Course in Criminal Law*

[4] Programa de Investigación Estratégica en Bolivia
[5] Escuela Superior Politécnica del Litoral
[6] Universidad Tarapacá de Arica
[7] Universidad Nacional del Altiplano Puno
[8] Universidad Politécnica de Catalunya
[9] Universidad Politécnica de Madrid
[10] www.dpic-uto.edu.bo

- *Mastery in Mining Environmental Engineering*

The mentioned courses were carried out successfully; all the professionals which took these courses finished them and obtained the degree they were pursuing. Some of the professionals do work at the University; therefore, the acquired knowledge not only benefited the professionals, but also benefited the university students.

The *Department of Postgraduate Studies and Scientific Research* has carried out several courses. Currently, approximately, 180 professionals are taking postgraduate courses at the Department. As a matter of fact, the *Diploma in Teaching at a Higher Education Level* is started once every six months because of the demand for this course is high. Besides this Diploma course, there are other courses that are currently carried out in the Department, such as:

- *Diploma Course in Information and Communication Technologies*
- *Mastery in Mining Environmental Engineering*
- *Mastery in Mining Environmental Technology of Gold*
- *PhD. in Environmental Sciences and Technology*
- *PhD. in Non-recoverable Natural Resources*

All the courses provided were and are carried out in Spanish. The only course that is using English language is the *Doctorate in Environmental Sciences and Technology.*

2. NEEDS OF SUPPORT

The *Department of Postgraduate Studies and Scientific Research* has signed some agreements with international universities, and with some institutions. These agreements were meant to develop some research, to train professionals

and students in some area of knowledge, improving their skills in the researching field. Lots of Diploma and Mastery Courses have been developed since the creation of the Department, which have contributed to the education of the Oruro citizens.

On May 18th, 2009, the Department of Postgraduate Studies and Scientific Research started the first PhD program carried out in Oruro. The Doctorate Course was about Environmental Sciences. This course has been developed in co-operation with the *Technical University of Berlin*, Germany. The course was addressed to professionals interested in the area. The agreement with the *Technical University of Berlin* would help Professionals of the *Técnica de Oruro University* update their knowledge of their subject fields. Besides that, they would be able to obtain the PhD degree.

This PhD course has become very important in Oruro City because the professionals only had the opportunity to attend a PhD course of this subject matter out of the country. As a matter of fact, there have been many PhD courses carried out in Bolivia, but it is known that only one concerning Environmental Sciences was carried out in the public university of Tarija in 2008.[11] Therefore, it was the first time a PhD course has been carried out in Oruro, moreover, a PhD course in Environmental Sciences.

Due to that, there were many people interested in the course. Thus, twenty four professionals joined the *Environmental Science and Technology* PhD course. These professionals are Architects, Agricultural Engineers, Electric Engineers or Industrial Engineers who teach at the *Técnica de Oruro University* or develop other activities in any other area at the university.

In order to obtain the degree, these professionals have to carry out a series of activities that a PhD Course requires. Among these, the post-graduated

[11] www.uajms.edu.bo

participants have to write a Research Profile, a Plan of Action and its Theoretical Basis, to develop the research, to write a technical report, and to write and dissert the PhD thesis. All of these activities must be carried out carefully and properly.

Nevertheless, there was a language problem. The agreement of the PhD course has been made with a German university, thus, the PhD professors come from Germany. The teachers did not speak Spanish. Besides, most of the PhD students did not speak German. Therefore, English was established as the intercommunicative language of the course because it is a language that has spread worldwide.

However, most of the PhD students did not speak English either. Only a third of them could communicate using written English, the other two thirds could not communicate at all. This problem was present not only in the PhD course, but also at the university level.

Unfortunately, English is not taught at an undergraduate level because there is no Language School or Department at the *Técnica de Oruro University*. Besides that, English has not been considered in the curricula of any of the Schools in the University, but in the Faculty of Engineering. The Faculty of Engineering has three levels of English in its curricula since 2003. Each level of English lasts six months and the students have only six hours of English classes per week. But, even English is considered in the curricula, it is not a compulsory subject, but an optional one. Thus, very few Engineering students and graduated Engineers speak English. In the group of graduated Engineers are considered the University Engineering Professors.

As it was previously mentioned, the PhD Candidates teach at the university, thus, their level of English was not enough to communicate easily in the course. Hence, the group of PhD students that did not speak English were forced to enter an intensive English course.

Meanwhile the PhD candidates were learning English, the *Department of Postgraduate Studies and Scientific Research* decided to start the Doctorate Course. The PhD candidates were told to present their thesis Profiles in Spanish, and the Department asked a person trained in the translation field to translate them.

Thus, the *Department of Postgraduate Studies and Scientific Research* signed an agreement with the *Department of Linguistics and Languages* from the *Mayor de San Andrés University.* With this agreement the *Department of Linguistics and Languages* had to provide a student that had finished studies in there. This student had to work as a translator by making use of the knowledge that was acquired in its five years of study.

Thus, we were in charge of correcting the thesis profiles if it was necessary, and then the translation process had to be carried out. During the translation process the identification of technical terms was developed in order to compile a list of terms. After the translation process, we continued with the correction and edition of the seventeen profiles of the PhD program.

In addition to the translation of the thesis profiles, the *Department of Postgraduate Studies and Scientific Research* needed the translation of some reports of studies carried out in the environmental area, as well as the translation of the web page. Since it is a public institution, the information they collected by their researches has to be spread. Also, because some of these researches or projects had a great scope, they needed to be translated to obtain financing for carrying out them. The translation process was carried out in the same way the theses profiles were translated.

To sum up, a translator was needed to overcome the language problem by developing a Spanish – English written translation of both the students' thesis profiles and the Department's scientific documents. With this, we helped to

make possible the communication between teachers and students, and the spreading of the information to obtain financing.

CHAPTER II

WORK PROPOSAL

1. BACKGROUND

The *Department of Linguistics and Languages*, a branch of the *Faculty of Humanities and Educational Sciences*, is at the *Mayor de San Andrés University*. This institution has as a goal to train students in the areas of research, teaching and translation. This training is made in the following languages: English, French, Spanish, Quechua or Aymara.

After five years of study, the students are able to obtain the *Licenciatura* Degree; they can choose among several modalities of graduation. One of them is the *Supervised Work*, which allows the student applying their acquired knowledge for contributing to the society by cooperating with an institution. The work to be developed must be determined by an analysis of the needs the institution may have.

The present *Supervised Work* was carried out in the *Department of Postgraduate Studies and Scientific Research,* a branch of the *Técnica de Oruro University.* A complete analysis of the needs of this institution was already explained in Chapter I (See page 5). Having considered all the information provided in the previous chapter, it can be understood that the present work was aimed at helping the *Department of Postgraduate Studies and Scientific Research* with the translation of seventeen PhD thesis profiles, two environmental proposals, one environmental report and a web page.

2. JUSTIFICATION

There were many reasons why this *Supervised Work* had to be carried out. As it is know, a *Supervised Work* is developed to accomplish a social function. And, helping the *Department of Postgraduate Studies and Scientific Research* did accomplish this requirement.

The *Department of Postgraduate Studies and Scientific Research* is an institution that works at the university level, therefore, it develops an Education labour. This institution works for the *Técnica de Oruro University,* which provides education to a lot of people because it is a Public university. According to Tellez (2009), the university has a population of approximately 19,816 students at the pre graduate level, and, according to the Secretary office of the *Department of Postgraduate Studies and Scientific Research*, there are 180 students at the postgraduate level.

By carrying out this work, we achieved a social function at different levels. First, the direct benefited people were the PhD students because we contributed to the translation of their profiles, which had to be submitted to the German PhD professors. In this case, we helped making the communication between PhD students and teachers possible. The list of terms compiled in the translation process will help the candidates when they write their theses and reports, because they will have to do it themselves in English.

Besides that, the *Department of Postgraduate Studies and Scientific Research* was also benefited directly. The report of an environmental study, the *Environmental Diagnosis of the Poopo Lake and its Tributary Rivers by Heavy Metals*, as well as other important proposals in the environmental area, such as the *Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative* and the *Technical, Socioeconomic and Environmental Proposal for Polluted*

River Sediment Treatment as an Alternative of Environmental Remediation and Local Economic Development, and its web page. We contributed to the spreading of the information of the carried out study and the web page, and made able the presentation of the translated proposals to international institutions in order to obtain financing to carry out these important projects.

Likewise, we were also directly benefited by developing this *Supervised Work*. We were able to apply the knowledge acquired studying at the *Department of Linguistics and Languages* in the correction of the Spanish texts, the process of translation itself, and the final edition of the texts. Also, we were able to gain experience in the translation area.

Second, the students of the *Técnica de Oruro University* were benefited in an indirect way, as well as the Students of the *Department of Linguistics and Languages*. The Spanish thesis profiles and their English translation were handed in to the *Department of Postgraduate Studies and Scientific Research.* This Department has a thesis bank at its webpage where these thesis profiles were uploaded. Students can access this information whenever they need, so that they can use it for further research. The students of the *Department of Linguistics and Languages* will be also benefited with the list of terms and the terminological analysis that will be handed in with the presentation of the *Supervised Work Report*. The list could help them in the Technical and Scientific Subject or in the translation of text in the environmental area, and the terminological analysis could be used as an example for other analysis.

Finally, other indirect benefited people are the people living in the communities that have been polluted by the mining activity. The translation of the Remediation Proposals and the spreading of this information would make possible obtaining financing to apply the proposals and remediate these polluted places. In order to comprehend the importance of the remediation of

the polluted places, it must be mentioned that the towns considered in the projects and proposals, such as Huanuni, Antequera, Santa Fé, Morococala, Japo, Aco Aco, Chacara, Pairumani, Sora Sora and Poopó, were declared in "Environmental Emergency" in October, 2009 by the *Vice-Ministry of Environment, Biodiversity and Forest Resources*[12].

The main consequences of the pollution in these places are the disappearance of water sources, death of fish, wild birds and other animals, Soil Degradation, minor quality and quantity in the cultivations. About 80 communities and approximately 2000 families would be benefited with the environmental remediation. This would improve their life quality, and the fauna and flora would not be in danger.

In addition to the communities, the future professionals of the *Técnica de Oruro University* will be benefited, because one of the aims of the PhD course is to train a staff of teachers with PhD level in order to use them in an autonomous PhD course. This will make easy to carry out a PhD course in Spanish. Besides that, as it was mentioned before, most of the PhD candidates are Teachers at the university, hence, the knowledge acquired in the PhD course will be used at the university itself.

3. OBJECTIVES

3.1. GENERAL OBJECTIVE

- To translate documents related to the Environmental area for the PhD candidates and for the *Department of Postgraduate Studies and Scientific Research*

[12] http://recursosnaturales-ceadl.blogspot.com/2009/10/gobierno-declara-en-emergencia.html

3.2. SPECIFIC OBJECTIVES

- To carry out the translation work following the corresponding stages:

    a) Correction and Edition of the source language documents (if needed)

    b) Translation of the first draft

    c) Review and correction of the translation

    d) Final edition of the translation

- To carry out a study of the translation procedures used in the translation process

- To carry out a terminological study of the technical terms found in the process of translation

- To built up an Spanish-English Terminology of the technical terms used in the documents

4. INDICATORS

In *Proyecto de Investigación* (Tintaya C., 2005), the author says "*Indicators are signs, referents or observable aspects which have been considered for verifying that the objectives and results have been reached*"[13]. Therefore, the objectives, indicators, and results are shown in the following chart.

[13] This quote is a translator own translation.

CHART 2.1. INDICATORS

Objectives	Indicators	Results
General Objective: To translate documents related to the Environmental area for the PhD candidates and the *Department of Postgraduate Studies and Scientific Research*	From January to August, 2010, the translation 299 pages is developed and concluded.	The whole translation of 299 pages has been presented within six months (134 workable days).
Specific Objective: To carry out the translation work following the corresponding stages:	From April to November, 2010, all the stages of the translation are completed.	299 pages translated are handed to the Head of the *Department of Postgraduate Studies and Scientific Research*
• Correction	• A Typology of mistakes is listed.	
• Edition of the source text (if needed),	• The mistakes are mended in the text.	
• Translation of the first draft ,	• Presentation of the first draft	
• Review and correction of the translation,	• A typology of mistakes is listed.	
• Final edition of the translation	• The mistakes are mended and the final translation is presented.	
Specific Objective: To carry out a study of the translation procedures used in the translation process	An illustration of the procedures was carried out.	All the procedures used in the translation process were listed.
Specific Objective: To carry out a terminological study of the technical terms found in the process of translation	Terminological cards are developed.	A terminological Corpus has been presented.
Specific Objective: To built up an Spanish-English Terminology of the technical terms used in the documents	A Terminology of technical terms is presented as a lexicographical work.	A Spanish- English Terminology of the technical terms has been built.

5. STRATEGY OF ACTION

The strategy of action has to do with the procedures that were used in order to carry out the *Supervised work*. Since this work was developed in the translation area, it referes especificly to the translation process. However, we needed to know what translation was before going through the steps followed and the methods used in this process,.

Etymologically, the word *Translation* derives from the latin word “translatio” which means "to carry across" or "to bring across". Though it was easy to understand what *Translation* was with Bell’s concept (1991:6), which says: *Translation is a process which transforms “a text originally in one language into an equivalent text in a different language, retaining, as far as possible, the content of the message and the formal features and functional roles of the original text”.* Thus, the translation process is understood as transferring the *Meaning* of a text from the source language **(SL)** into the target language **(TL)**.

To carry out the translation process it was important to develop an analysis of the source text, to choose an appropriate method of translation and to use the proper tools. In the following points, the analysis of the text, the methods and tools used in the translation of the *Department of Postgraduate Studies and Scientific Research***’**s documents are explained.

5.1. ANALYSIS OF THE SOURCE TEXT

To start the Analysis of the text, first of all we started by Reading. According to Wikipedia, “*Reading is a complex cognitive process of decoding symbols for the intention of constructing or deriving meaning (reading comprehension)”*. To construct or derive meaning Human beings use some cognitive processes that include remembering or using the background knowledge, as well as understanding, forming and associating concepts.

According to Newmark (1988), *Reading is the first step of the analysis because it help us to determine the intention and the way the text is written*; thereby, to select a suitable translation method. Thus, the main point of reading is getting the intention of the text.

He also stated that to determine the intention of the text there are four features that must be considered:

- **Function**. It can be defined as the purpose the text was written for. There are three types of function: *Informative*, that is based on the message; *Expressive*, that shows ideas, beliefs, thoughts, based on the author's opinions; and *Vocative*, that is based on the reader's reaction (***op. cit.)***. The following paragraph is presented to exemplify the function of the text:

  "La historia de este lago se remonta a cuando existía un gran lago salado, geológicamente a la edad del Pleistoceno superior cuando sucedieron varias fases glaciares que determinaron una progresiva reducción de la superficie lacustre, que al comienzo del Pleistoceno se nivelaba alrededor de 200 m por encima de su nivel actual, con un área de más de 50.000 km^2."[14]

▭	Impersonal forms
▢	Past verbs

FUNCTION: Informative

It was easy to recognise that this paragraph had an Informative function because it was providing true facts about the lake, specifically about how the lake was formed. Besides that,

[14] Taken from *Environmental Diagnosis of the Poopo Lake and its Tributary Rivers by Heavy Metals,* Spanish version, page 3

impersonal or third person forms and the Past verbs were used in the text providing specific information. All the documents and thesis profiles that were translated presented the Informative Function.

- **Style**. It is the way a text is written. The four parameters inside this category are: *Narrative*, a dynamic sequence of events, where the emphasis is on the verbs; *Descriptive*, which is static, with emphasis on linking verbs, adjectives, and adjectival nouns; *Discussion*, a treatment of ideas with logical argument; and *Dialogue* with emphasis on colloquialisms and phaticisms (***op. cit.***).

  In order to understand better the Style of a text, the Descriptive style found in one of the translated documents is shown in the following paragraph:

  "Las profundidades del Lago Poopó no son muy variables, y va descendiendo hacia el centro del Lago; donde se tiene profundidades de hasta 2 metros. Las cuencas principales son las de Coipasa; Desaguadero y Poopó; mientras que las microcuencas, del sector con mayor impacto minero son la de Huanuni; Antequera; Santa Fé y Poopó."[15]

▭	Impersonal form	⬭	Adjective
□	Verb *To Be*	_ _ _	Adverb and Preposition

FUNCTION: Informative
STYLE: Descriptive

[15] Taken from *Environmental Diagnosis of the Poopo Lake and its Tributary Rivers by Heavy Metals,* Spanish version, page 4

The text had an informative function because it provided true facts about the lake and used impersonal forms; and a descriptive style because it provided some facts about the depths of the lake, establishing which basins were more important.

The descriptive Style uses adjectives, location adverbs and prepositions, the ***verb*** to be. This was the main style used in the documents of the *Department of Postgraduate Studies and Scientific Research*, as well as in the thesis profiles.

- **Register.** It is the variety of language used in the text. It is divided into Simple, Popular, Neutral (using basic vocabulary only), Educated, Technical, and Opaquely Technical (***op. cit.)***.

  In the documents of the *Department of Postgraduate Studies and Scientific Research* and in the thesis profiles a Technical Register was used mainly, but the neutral one was also used. As it can be perceived in the following example, the Technical register was present in the text.

  > "La cuenca está formada geomorfológicamente por un paisaje de geoformas estructurales, denudacionales, deposicionales. Las unidades de origen estructural originadas por el plegamiento de las rocas sedimentarías corresponden a laderas, serranías disectadas, laderas y serranías de pendiente fuerte, escarpes y otros. Las unidades de origen denudacional están conformados por los depósitos aluviales y por los valles glaciales, son producto de la erosión retrógrada, los periodos cuaternarios son clásicos ejemplos de

estas unidades. Las unidades de origen deposicional son el resultado de la erosión, traslado y deposición de los materiales meteorizados. Estas unidades están representadas por terrazas, abanicos aluviales, depósitos de río, morenas y escombros de talud."[16]

	Impersonal form		Adjective
	Verb *To Be*		Technical register

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical

In the previous example, the text had an informative function because it provided true facts about the basin and used the third person forms; and a descriptive style because it provided some facts about the Basin geomorphological structure using adjectives and the ***verb*** to be. The Technical register was underlined in the text, showing the presence of several technical terms. The non underlined words are a clear example of a neutral register, which is understandable to any person. Both registers were used all along the texts.

- **Tone.** It refers to the use of the words that change the meaning of the text, such as Adjectives. It is divided in four categories. *Hot*, *Warm*, *Neutral*, *Cold* (***op. cit.)***.

  An example of one of the translated texts is shown in the following paragraph:

[16] From *Technical, Socioeconomic and Environmental Proposal for Polluted River Sediment Treatment as an Alternative of Environmental Remediation and Local Economic Development,* Spanish version, page 21

"Las características del viento, el contenido de humedad y de polvo afectan al tiempo de vida de las instalaciones. Algunos estudios han mostrado que la erosión eólica del suelo es alta en la región produciendo consecuentemente una mayor carga de partículas solidas en el aire. El presente estudio pretende realizar mediciones sobre la carga de partículas y obtener conclusiones a cerca de la adecuación de los sitios escogidos y la altura apropiada."[17]

	Impersonal form		Adjective
	Verb *To Be*		Technical register

CHART 2.2. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical
TONE: Neutral

In the previous example, the text had an informative function because it used the third person forms talking about a proper place to install wind generators in the Oruro High Plateau; and a descriptive style because it provides information about the aims of the study, it also uses the ***verb*** to be. The Technical register was underlined. The non underlined words represent the neutral register. The neutral tone is represented with the adjectives which although qualify the nouns they lack of opinion; the whole text lacked of opinion and reported true facts, in other words, it only conveyed information. The thesis profiles and the documents of the

[17] Taken from *Thesis Profiles,* Spanish version, page 72

Department of Postgraduate Studies and Scientific Research that were translated presented a Neutral Tone.

5.2. TRANSLATION METHODS

Translation methods are related to the way of translating a text. In his book, *A textbook of Translation,* Newmark (1988) lists eight translation methods:

- Word-for-word Translation
- Literal Translation
- Semantic Translation
- Adaptation
- Free Translation
- Idiomatic Translation
- Communicative Translation

Each of these translation methods are used for translating a certain type of text. Therefore, the analysis of the source text is essential in order to determine which method will be selected.

5.3. TRANSLATION PROCEDURES

In order to understand better the concept of translation procedures, it is necessary to establish the difference between *Translation Methods* and *Translation Procedures*. Quoting Newmark (1988), "*While translation methods related to whole texts, translation procedures are used for sentences and the smaller units of language*". Therefore, translation procedures depend on the context.

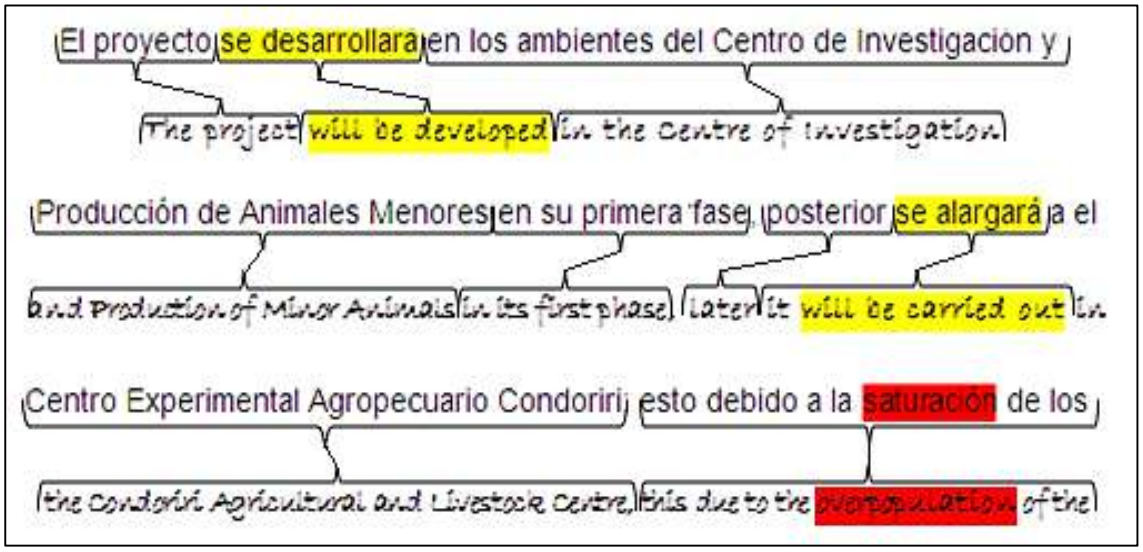
Newmark (1988) suggests the following procedures: Literal, Transference, Naturalization, Cultural equivalent, Functional

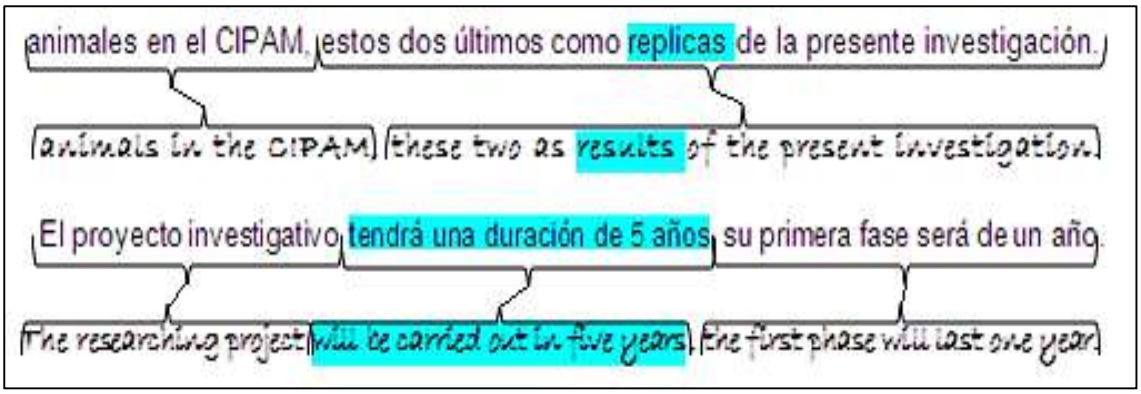
equivalent, Descriptive equivalent, Synonymy, Through translation, Transposition, Modulation, Recognized translation, Translation Label, Compensation, Componential analysis, Reduction and Expansion, Paraphrase, Couplets and Notes.

Other authors that use the term Procedures are Vinay & Darbelnet (1973). They propose the following seven procedures: Loan, Calque, Literal Translation, Transposition, Modulation, Equivalence, and Adaptation.

In the translation of the documents of the *Department of Postgraduate Studies and Scientific Research*, the following procedures were used in the translation process: Literal, Synonymy, Transposition, and Modulation. The mentioned procedures were chosen because they were learnt and used in the subjects *Translation Techniques*, and *Translation Workshop I* and *II*. These procedures were identified in the following example taken from the developed translation.

FIGURE 2.1. TRANSLATION PROCEDURES





	Synonymy
	Transposition
	Modulation

The previous paragraph[18] presented the following features in the Text Analysis:

CHART 2.3. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral – Technical
TONE: Neutral

The translation was developed trying to follow the Literal Method, which aims at converting the source text grammatical constructions to their nearest target language equivalent. Of course, sometimes it was necessary to change the structure of the target text in order to keep the meaning of the source text.

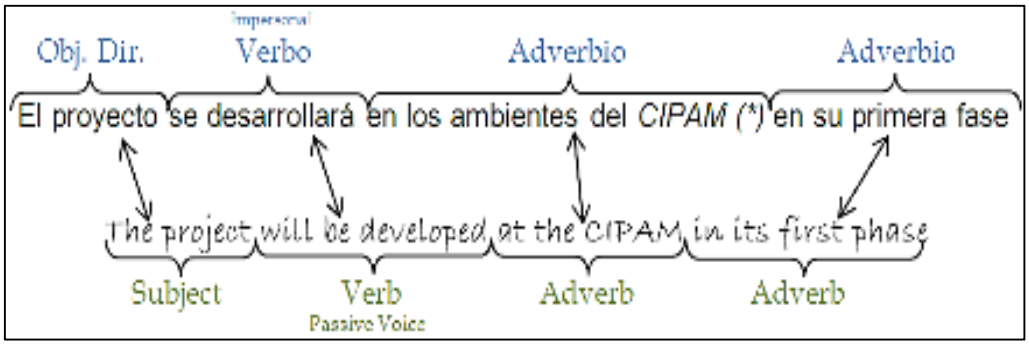
The red-highlighted words are an example of the use of the Synonymy procedure. The literal translation of the Spanish word "saturación" is "saturation", but instead of using saturation, "overpopulation" was used; this in order to have a better meaning.

[18] Taken from *Web Page,* Spanish version, page 5, and English version, page 8

Usually "saturation" is used in many areas expressing that "*there is too much of something*" and as the text referred to animals, the word "overpopulation" represented better the meaning of "saturation".

The yellow-highlighted parts show the Transposition procedure used in the translation process. In the first case, the Spanish version presented a sentence in an Impersonal Active Form *"*se desarrollará*",* in Future tense. Thus, the Sentence model in Spanish was **Direct Complement – Verb – Adverb - Adverb**. In the English version the Syntactic Model is **Subject – Verb – Adverb**, but it is in the Passive Voice.

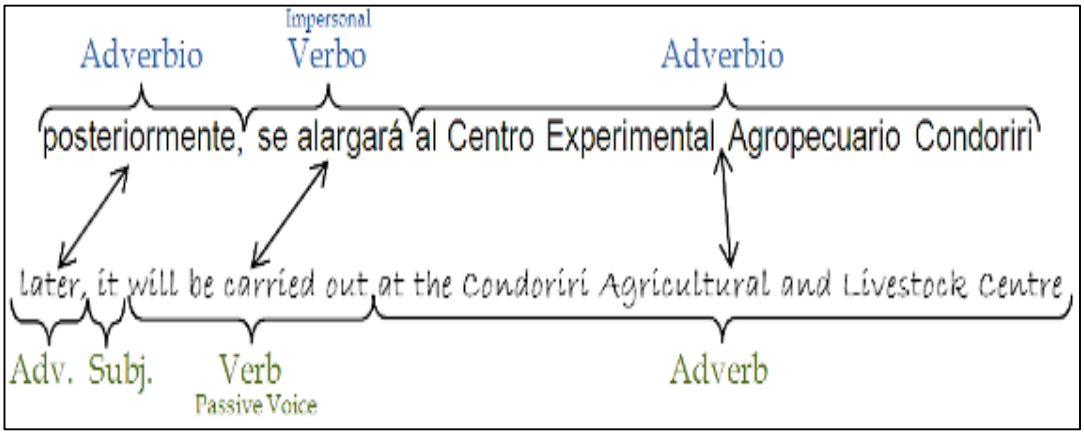
FIGURE 2.2. TRANSPOSITION EXAMPLE.



(*) CIPAM is the acronym of Centro de Investigación y Producción de Animales Menores, and was shortened in order to make the analysis easier.

In the second case of Transposition, the Spanish text presented an **Adverb – Verb – Adverb** Model. In the English version it was an **Adverb – Subject – Verb – Adverb** Model. As in the first case of transposition, the Spanish sentence had the impersonal form, and the English sentence was translated in the passive voice.

FIGURE 1.3. MODULATION EXAMPLE.



The blue-highlighted parts show the **Modulation** procedure. In these parts, it can be perceived a non-denotative meaning; the literal translation of "replicas" would be "reply", but as it is referring as a consequence, the word used was "result". In the second case, the structure "tendrá una duración" was translated as "will be carried out", which is not its literal translation. If the denotative meaning was used, the translation would have been "will last".

5.4. STUDY OF THE PROCEDURES

This study is a complementary activity to be developed for contrasting the Translation Procedures used in the translation of the documents. This contrast refers to the frequency a specific Procedure was used more than another procedure.

In order to determine the type of procedure used, the following features were taken into account:

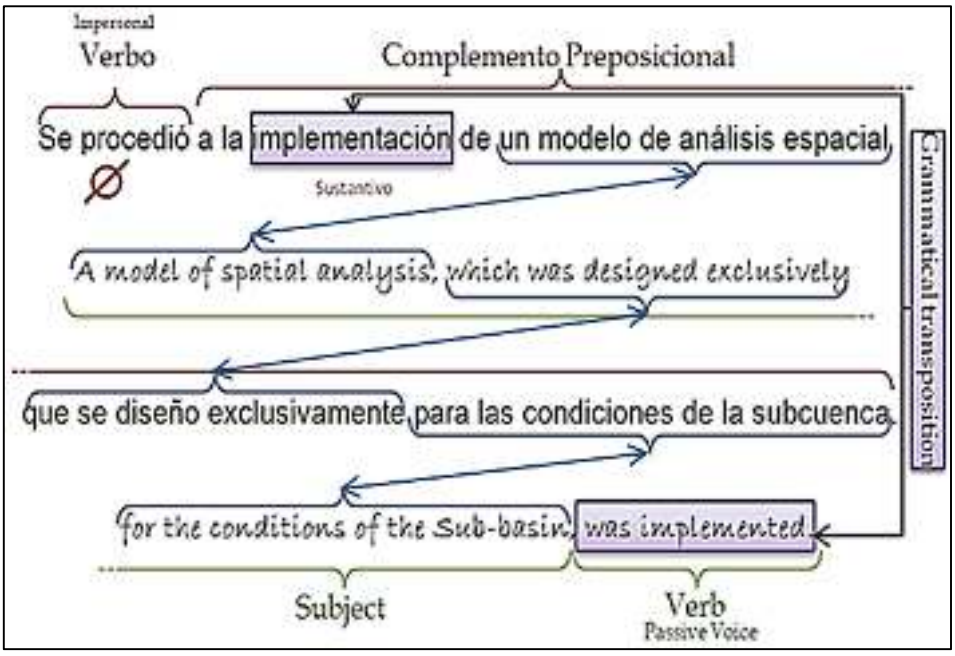
Literal: Denotative meaning, Similar Syntactical Structure. For example, lineal and basic shifts **adjective + noun**:

Words were translated by using denotative meaning and reproducing the structure, the basic shifts are normal in the translation from Spanish into English.

Synonymy: Use of synonyms, Similar Syntactical Structure

In this example, the translation of the Spanish verbal syntagma "se dedican a" into the English verbal phrase "*work in*" is a clear example of use of the synonymy procedure.

Transposition: Change in the order of Syntactical Structures (Syntactical Transposition) or in the grammatical category (Grammatical Transposition). The following sentence shows both types of transposition:

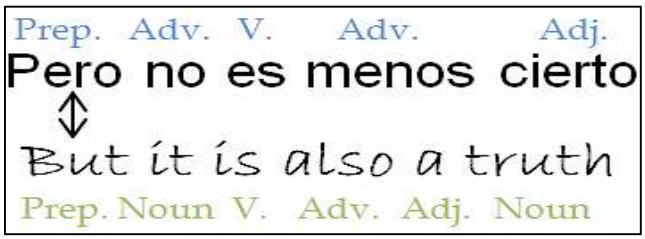


The Syntactical Transposition from the Spanish **Verbo-Complemento Preposicional** structure, **V CP**, was the English *Subject-Verb* structure, **S V.** The Grammatical Transposition was made with the Spanish word "Implementación" that was working as a noun in the **Complemento Preposicional**, and was changed into a verb in the English sentence.

Modulation: Connotative meaning, change of the Syntactical Structure (transposition)

In the previous example, it can be noticed that the blue-highlighted Spanish sentence is denying something and the English sentence

is assuring something as a truth. Besides that, the English structure does not follow the same Spanish structure.



Having considered and determined the type of procedure used in the translation of the documents of the *Department of Postgraduate Studies and Scientific Research,* the procedures used were listed according to the following chart:

CHART 2.4. TRANSLATION PROCEDURES

Nº	Doc	Art	Nº	PROCEDURE			PAGES		REFERENCE
				NAME	FROM	TO	SPA	ENG	
1									
2									
3									
4									
5									

The **DOC** column stands for the name of the documents in which the procedure is used. If the document presents articles, the number of them will be placed in the **ART**. The **Nº** column stands for the number of translation procedure, whether it is inside the article or inside the document.

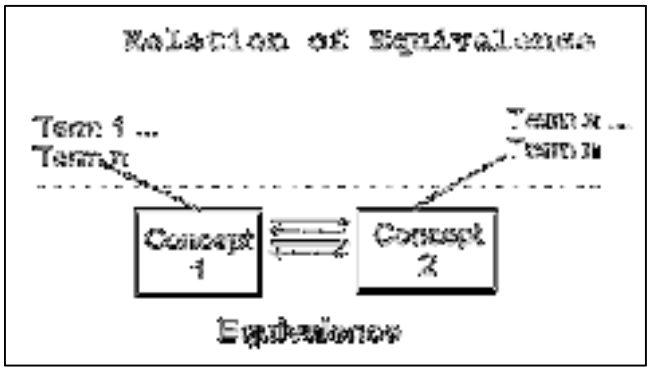
The **PROCEDURE** column has three different sub-columns, **NAME** for the names of the procedures; **FROM** and **TO** are used in case a Transposition procedure was found, in order to establish whether it was a Grammatical or Syntactical Transposition. The **PAGES** column stands only as reference to find the procedure in both, the source

language text and the Target Language text. The **SPA** column addresses the page in the Source text, and the **ENG** addresses a page in the Target text. The column of **REFERENCE** stands for an English word or expression referring the sentence in which the procedure was found.

5.5. TERMINOLOGICAL STUDY

According to Pavel (2008), *Terminology is the set of special words belonging to a science, an art, an author, or a social entity*. Because we are working with a translation of technical texts, a terminological study is needed for avoiding arbitrary meaning of terms in the translating process. The terminological work is aimed at building up specialized vocabularies. The Terminology to be built is based on a Functional Equivalence of the terms. According to Wüster[19], Equivalence is a relation between concepts having the same characteristics.

FIGURE 2.4. RELATION OF EQUIVALENCE



The study carried out in this *Supervised Work* takes into account the Sandrini's **Direct Relation** proposed in his PhD Thesis (1996), which relates two concepts directly. It means both have the same function and

[19] Mentioned in Sandrini (1996:3)

the same position within the concept structure and both are part of a setting that refers to the same Area or subject field.

In Pavel's words, *A term, or terminology unit, is the name or designation of a concept in a particular subject field*. A term may be: a word, an expression, a symbol, a chemical or mathematical formula, a scientific name in Latin, an acronym. It is distinguished from a word in general language by its single-meaning relationship (called monosemy) with the specialized concept that it designates and by the stability of the relationship between form and content in texts dealing with this concept (called lexicalization).

There are two types of terms: Simple terms, which consist of just one word (compound or derived), and Complex terms, that have two or more words and form a terminological phrase.

It is very important to develop this stage properly. There are some features that must be taken into account in order to compile the terms, which will be considered in the following chart.

CHART 2.5. TERMINOLOGICAL STUDY

Nº	Spanish Entry	Gr. C.	Etymology		Area	Definition	Source	English Equivalent	Observations	
			Origin	Meaning					Prop.	
1										
2										
3										
4										
5										
6										
7										

Since the Source language is Spanish, we begin with the **Spanish entries**, and then the **grammatical category** of the entry is considered. After that, the **etymological** information is placed, and the **area** in which

the term is used; this helps in understanding better a word. The **Definition** is very important because it provides essential features of a concept for distinguishing it from others, it is closely related to the **Source,** which helps finding the definition if it is needed again. After all, there is the **English equivalent**, and the **observations**, that provide more information regarding the usage of the term, such as Synonyms. This compilation was based on a TERMINOLOGICAL CARD, provided by Rosa Luna[20] from UNIFÉ[21]:

CHART 2.6. TERMINOLOGICAL CARD

TERMINOLOGICAL CARD		
SPANISH ENTRY	***ETYMOLOGY***	***AREA***
DEFINITION		
SOURCE OF REFERENCE	***ENGLISH EQUIVALENT***	
OBSERVATIONS		

The terminological cards and the way of storing the information may vary according to the needs the translator has. For instance, there is a chart similar to the presented above. The card is printed in both sides, in one side the Spanish features are taken into account, and on the other side the English ones. But in this charts, the etymological information is not taken into account. Here is an example.

[20] Mg. Rosa Luna García, Translator and Terminologist, teaching at the UNIFÉ
[21] UNIFÉ: Universidad Femenina del Sagrado Corazón, Peru.

CHART 2.7. TERMINOLOGICAL CARDS (B)

TERMINOLOGICAL CARD (A)	
ENGLISH TERM	***AREA***
Alluvial fan	Geomorphology
DEFINITION	A fan-shaped deposit with its apex pointing upstream and formed by a stream at a point where it abruptly leaves a narrow valley or ravine and enters a larger valley or open plain.
SOURCE OF REFERENCE	***SPANISH EQUIVALENT***
http://www.termiumplus.gc.ca/tpv2source?lang=eng&index=alt&i=1&src_id=MOLLA1982&rlang=en&titl=alluvial%20fan&srchtxt=ALLUVIAL%20FAN&fchrcrdnm=1	Abanico alluvial
OBSERVATIONS	

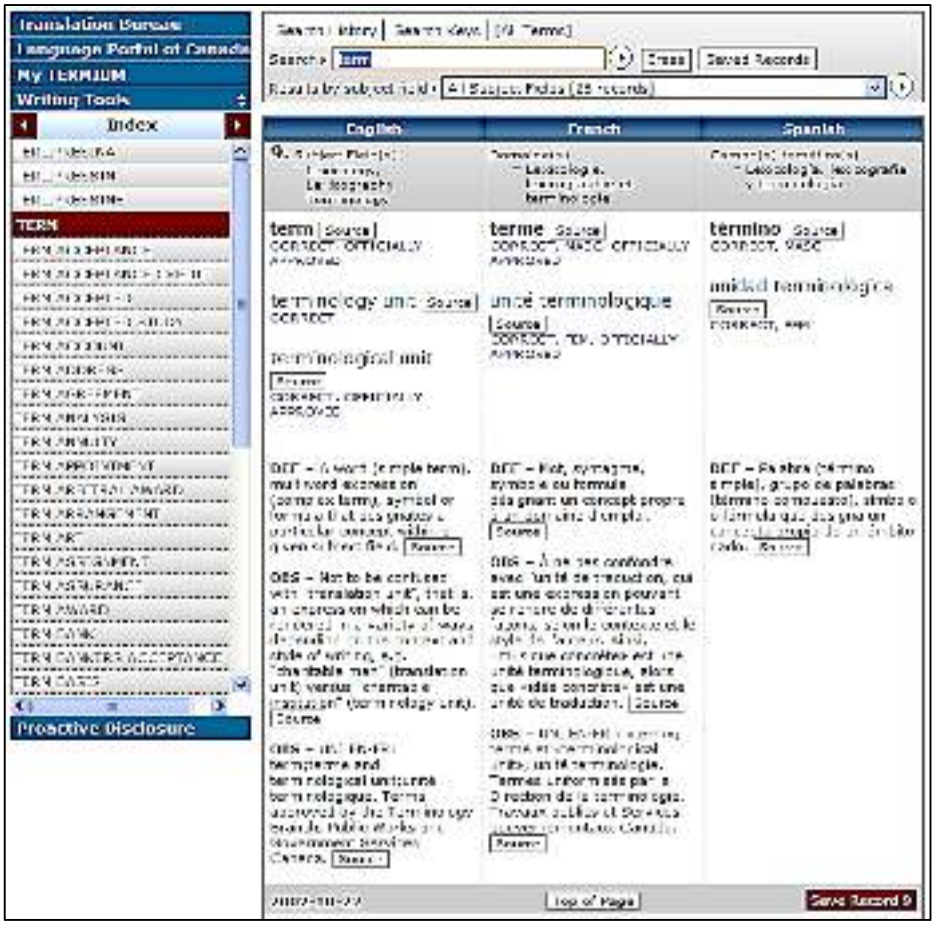
FICHA TERMINOLÓGICA (B)	
TÉRMINO	***ÁREA***
Abanico aluvial	Geomorfología
DEFINICIÓN	Acumulación de materiales detríticos en forma de abanico o segmento de cono, depositada por una corriente fluvial o torrencial.
FUENTE DE REFERENCIA	***EQUIVALENTE INGLÉS***
http://www.termiumplus.gc.ca/tpv2source?lang=eng&index=alt&i=1&src_id=SP-951990&rlang=es&titl=abanico%20aluvial&srchtxt=ALLUVIAL%20FAN&fchrcrdnm=2.	Alluvial fan
OBSERVACIONES	

Referring to the storing form, currently, there are many programmes (software) that help translators and terminologist to compile the terms they are working with. An online software which was very helpful to the development of the present work was the TERMIUM Plus® [22]. It is a terminology database manager of the Government of Canada. It stores

[22] http://btb.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng

terms in English and French, mainly, but some equivalents are found in Spanish, as well.

FIGURE 2.5. TERMIUM PLUS DATABASE



This is a screenshot from TERMIUM Plus Database showing the trilingual (English-French-Spanish) record for ***'term'***. The record shows the subject field, the main entry term and synonyms accompanied by parameters and links to source references. The record also shows textual supports such as definitions and observations relating to the term.

5.6. TOOLS

Tools are understood as the materials used in order to carry out some activities. In this case, the tools are materials that the translator uses in order to carry out the translation, such as Dictionaries, books of reference, and other non-printed materials.

With the development of technology, the invention of machines has made human being's work easier. Computer is the machine that helps people in many ways. Thanks to computers many other technologies have been created or improved. In the translation area, computers have made the work less complicated. Writing the translation and correcting it in the computer is faster and easier because computers have several softwares that have left the typing machine aside. Besides that fact, the Internet, that according to *Wikipedia* is *"*a global system of interconnected computer networks*",* has contributed breaking geographical and time boundaries. Nowadays, it is not necessary to go to the library in order to borrow books. People can find them online in the comfort of their own homes. Internet makes possible to access many virtual newspapers, libraries, Dictionaries, etc. And with the websites called **WAREZ** the books, music, videos, and other files, can be shared worldwide. For example, there are plenty of websites people can download complete books from.

Translators use computers and internet to translate. It is easy to correct the source text, write the translation, correct the translation and carry out all the translation process, with the computer softwares.

In the development of the translation process, the following materials were used:

- Translation Notes which were taken in the subjects of Translation Procedures, Translation Workshop I, and Translation Workshop II, at the Department of Linguistics and Languages.
- A computer
- Terminological Cards (for the technical terms)
- Internet, used for the availability of resources such as:
    - ✓ Monolingual Spanish Dictionaries, e.g. www.rae.es, which is the Dictionary of the *Real Academia Española*
    - ✓ Bilingual Dictionaries (Spanish-English), for instance: www.wordreference.com, www.merriam-webster.com, www.thefreedictionary.com
    - ✓ Technical Dictionaries (Engineering, Architecture, etc) that were downloaded from websites such as www.4shared.com
    - ✓ Etymological Dictionaries, such as the www.etymonline.com
    - ✓ Books, such as *A textbook of Translation* by Newmark, and many other books that are mentioned in the Bibliography, which were downloaded from rapidog.com, www.4shared.com and many other websites.

5.7. PLAN OF ACTION

According to Tintaya (2005:339), the Plan of action is a guide or description of the activity sequences and stages that are developed during the application of the proposal of the *Supervised Work*.

Thus, the proposed objectives, the carried out activities, the procedures used in translation, the time of work, the used resources and the responsible person/people performers of the activities are in the following chart, describing the *Supervised work* developed in the *Department of Postgraduate Studies and Scientific Research*.

CHART 2.8. PLAN OF ACTION

Objectives	Activities	Techniques	Time	Resources	Responsible
To carry out the translation work following the corresponding stages: Correction and Edition of the source language documents (if needed), Translation of the first draft	• To analyse the source text in order to select an appropriate translation method and procedure • To translate the documents using the appropriate Method and procedure (first draft)	▪ Identification of the Function, Style, Register and Tone ▪ Use of the translation methods and procedures	January to August 2010	☑ Source Text ☑ Computer ☑ Translation notes and books ☑ Computer ☑ Internet ☑ Online Dictionaries	❖ Translator
To review and correct the translation	• To analyse and correct the target text	• Use of the translation methods and procedures		☑ Source text ☑ Target text ☑ Computer ☑ Internet ☑ Online Dictionaries	❖ Translator ❖ Academic Tutor
To edit the translation	• To edit the corrected documents				
To carry out a study of the translation procedures used in the translation process	• To list the Translation procedures used in the translation process	• Filling in Chart 2. Translation Procedure	January to August 2010	☑ Source text ☑ Target text ☑ Computer	❖ Translator
To carry out a terminological study of the technical terms found in the process of translation	• To analyse and list the terms found in the source language with its features	• Filling in Chart 3. Terminological Study		☑ Source text ☑ Target text ☑ Computer ☑ Internet ☑ Online dictionaries	❖ Translator
To built up an Spanish-English Terminology of the technical terms used in the documents	• To compile the Spanish - English terms	• Listing the terms in a Bilingual Terminology (Spanish term – English Equivalent)		☑ Source text ☑ Target text ☑ Computer	❖ Translator

CHAPTER III

DEVELOPMENT OF THE PROPOSAL

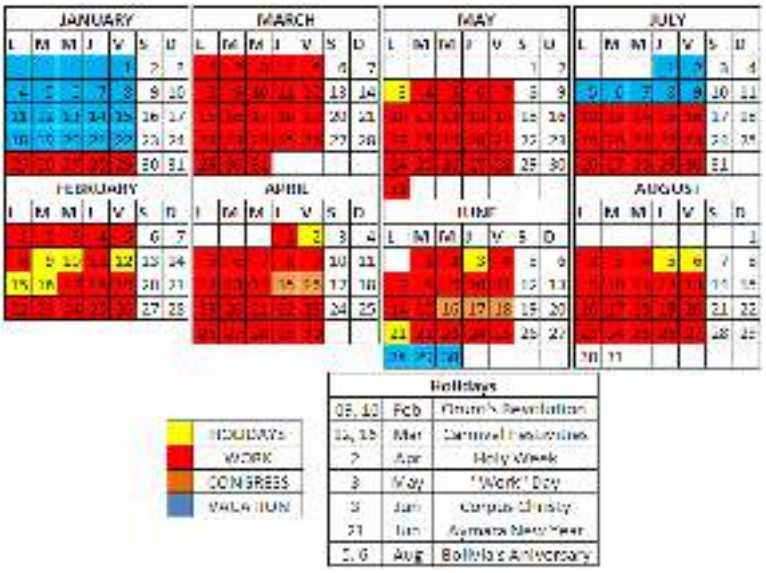
The description of the activities carried out during the development of the *Supervised Work* is explained in detail in this chapter.

Firstly, it must be mentioned that after having finished our studies in the *Department of Linguistics and Languages*, we returned to Oruro because we were born in Oruro and our family lived there. We only moved to La Paz City in order to study Linguistics and Languages and when our studies were finished there was no reason to stay in La Paz. But, as we have not graduated yet we needed to choose a graduation modality and opted for the *Supervised Work*. We looked for an institution in Oruro that had needed help in the translation area and found the *Department of Postgraduate Studies and Scientific Research.* Afterwards, we accomplished an agreement between the institution and the *Department of Linguistics and Languages.*

In the agreement it was established that the translator had to work in the institution 8 hours a day, from 08:30 to 12:30 and from 14:30 to 18:30; 5 days a week, from Monday to Friday; for a semester.

In the following figure, a 2010 calendar is presented, in which the months worked in the *Department of Postgraduate Studies and Scientific Research* are shown. Besides that, the days are coloured differently in the figure to show the Workdays (coloured in red), Holidays (coloured in yellow), the days in which two Congresses were carried out (coloured in orange), and the Vacation days (coloured in blue)

FIGURE 3.1. CALENDAR 2010 JANUARY-AUGUST



The work has lasted 134 days, surpassing the 1000 hours required in the regulations. It means a 1072-hour work was accomplished. This work has been developed from January 25th to August 27th, 2010. Seventeen theses profiles, two environmental proposals, one environmental report and a web page have been translated in this term, reaching 299 pages. Approximately, each page was translated in 3,5 hours.

In order to make this process easier, the documents have been divided into three groups. The first group embraces the three documents; *Environmental Diagnosis of the Poopo Lake and its Tributary Rivers by Heavy Metals, Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative*, and the *Web Page.* The Second group includes the seventeen translated thesis profiles. And the last group contains the article *Technical, Socioeconomic and Environmental Proposal for Polluted River Sediment Treatment as an Alternative of Environmental Remediation and Local Economic Development*.

The titles of the twenty-one documents of the *Department of Postgraduate Studies and Scientific Research* and the number of translated pages of each article are presented in the following chart:

CHART 3.1. TRANSLATED DOCUMENTS

	Nº	Title	Pag
Group 1	**1**	Environmental Diagnosis of the Poopo Lake and its Tributary Rivers by Heavy Metals	21
	2	Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative	32
	3	Web Page	29
		Total Pages Group 1	**82**
Group 2	**1**	Proposal of a Mining and Environmental Land Use and Organization plan - the Huanuni Case	6
	2	Proposal of Urban Agricultural Development in Oruro	4
	3	Proposal of the Ethnographic Ecotouristic Route of the Uru Muratos, Poopo Lake	5
	4	The Main Environmental Impacts in the High Risk Settlements of the South Zone of the Oruro City	5
	5	Microenergy in Social Dwelling in Oruro, Bolivia	4
		I Jornada Científica y Tecnológica de la UTO	
	6	Application of Evaluation Methods of Environmental Impacts for the Sustainable Urban Development	4
	7	Study of Tolerance of Heavy Metals in Native and Introduced Forage Species and Cultivations of importance in the Poopo Lake Basin, influence areas and other Areas of the South High Plateau of Bolivia	5
	8	Control Strategies in Photovoltaic Systems to obtain Chloride from The Uyuni Salt Flat	6
	9	Study of the Environmental Use and Management of the Sediments of the Poopo Lake Basin	5
	10	Use of Nanofluids for the Generation of Solar Electric Powder in a Stirling Engine	6
	11	Study of the Treatment of Mining Acid Water by Passive Methods (Leachates of Compost in a Limestone Environment) with Irrigation Purposes	5
	12	Study of the Sustainability in the Bolivian Underground Mining	6
	13	Study of the Process of Evapotranspiration of Native plants in SDR Effect Coverages with Mining Places Restoration Purposes	6
	14	Development of Microfiltration and Ultrafiltration Membrane for Residual Water Treatment in Membrane Bioreactor	4
	15	Effects of Climate Change in the Desertification of Soils in the Poopo Lake Basin	5
	16	Generation of Wind Electric Energy in Bolivia	8
	17	Study of the Heavy Metal Absorption in Native Plants with Restoration Purposes of Polluted Soils	4
		Total Pages Group 2	**88**
Group 3	**1**	Technical, Socioeconomic and Environmental Proposal for Polluted River Sediment Treatment as an Alternative of Environmental Remediation and Local Economic Development	129
		Total Pages Group 3	**129**
		Total of Translated Pages	**299**

1. WORK SCHEDULE

The following chart shows the work schedule for the *Supervised Work,* aimed at defining the time spent in each of the activities developed in the *Department of Postgraduate Studies and Scientific Research.*

CHART 3.2. WORK SCHEDULE

	Stage	Task	Months																																							
			Jan				Feb				Mar				Apr				May				Jun				Jul				Aug				Sep				Oct				Nov			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Group 1	**Stage 1**	☑ Translation of the First Draft																																										
		☑ Selection of Specific Terms																																										
	Stage 2	☑ Review and Correction																																										
		☑ Edition																																										
Group 2	**Stage 1**	☑ Translation of the First Draft																																										
		☑ Selection of Specific Terms																																										
	Stage 2	☑ Review and Correction																																										
		☑ Edition																																										
Group 3	**Stage 1**	☑ Translation of the First Draft																																										
		☑ Selection of Specific Terms																																										
	Stage 2	☑ Review and Correction																																										
		☑ Edition																																										
	Stage 3	☑ Study of the Translation procedures																																										
		☑ Analysis of the Terminology																																										

2. SEQUENCE OF ACTIVITIES

2.1. FIRST STAGE

a) Analysis of the text

As it was mentioned before, the Analysis of the text let us know the type of text we are dealing with. Therefore, the Source Text was analysed according Newmark's Text Analysis (1988).

CHART 3.3. ANALYSIS OF THE TEXT

Text Analysis	Group 1	Group 2	Group 3
Function	Informative	Informative	Informative
Style	Descriptive	Descriptive	Descriptive
Register	Technical	Technical	Technical
Tone	Neutral	Neutral	Neutral

The Texts are informative because they give data to students, professors and people interested in the area, about the environmental projects that were developed in the *Department of Postgraduate Studies and Scientific Research*. The Style is Descriptive, because the texts present linking verbs, active and passive voice. Besides, the texts tell how the projects were developed. The register is neutral because the vocabulary used in the text is technical or basic. The tone is also Neutral because there are not soft or cold intensifiers; the text also presents impersonal sentences mainly, as well as third person sentences.

b) Translation of the first draft of the text

To carry out this activity, first we had to choose the proper translation methods. The method chosen is Literal Translation because the translation had to be close to the source text according to the referents it presented, such as: extra-linguistic facts, technical terms, simple grammatical structures, third person sentences and others, as Newmark mentions in his book (1995:50).

Considering the Newmark's translation procedures, here are the ones used in the process of translation: Literal, Synonymy, Transposition, and Modulation. In some cases, more than one procedure was applied in one paragraph because the use of only one procedure was not enough for grasping the idea of the source text, resulting on a weak translation of the paragraph. Therefore, other procedure was really needed.

The process of translation was carried out in about nine weeks of work, developed at the *Department of Postgraduate Studies and Scientific Research.*

c) Selection of Specific terms

As the translation process was being developed, the less or non familiar words were highlighted and listed in order to find a proper equivalent in the target language and develop a better translation of the text. Besides, technical terms were listed to develop the terminological study as well as the Terminology of technical terms.

2.2. SECOND STAGE

a) Review and Correction

These activities were carried out with the Academic Tutor, Lic. Virginia Coronado Conde. It was very important to review the translation as soon as possible, because it had to be delivered to the head of the *Department of Postgraduate Studies and Scientific Research.*

The activities could not have been developed at the end of the translation of each article due to the unavailability of time and the distance, because the *Supervised Work* was carried out in Oruro City and the correction stage had to be developed in La Paz city, because the Academic tutor worked there. Thus, the Academic Tutor and we had to program a series of days in which both of us were available to work in the review and correction process. Therefore, we had to travel to La Paz on the days the tutor and we had agreed, carrying the source texts and the translations.

After an agreement was reached, the review of the translation sample of the First group was carried out during the second and third week of March. An average sample of 14 pages was reviewed and corrected per day, in six days of work, from March 9th to 18th, 2010.

The review of the Second group was developed in seven days of work, between the last two weeks of May. As in the first group, an average of 14 pages was reviewed per day.

The review of the Third group was carried out the last three weeks of August. Since this group was the largest, an average of 14 pages was translated in nine days of work, from August 10th to 26th, 2010.

The days of the meetings and the number of pages corrected in each session are shown in the following chart.

CHART 3.4. REVIEW AND CORRECTION SCHEDULE

	Review	Date	Pages
First Group	First Review	March 9th, 2010	**EDPL:** 14 pages
	Second Review	March 10th, 2010	**EDPL:** 7 pages **RHRS**: 7 Pages
	Third Review	March 11th, 2010	**RHRS**: 14 Pages
	Fourth Review	March 16th, 2010	**RHRS**: 11 Pages **WP**: 3 Pages
	Fifth Review	March 17th, 2010	**WP**: 14 Pages
	Sixth Review	March 18th, 2010	**WP**: 12 Pages
Second Group	First Review	May 17th, 2010	**TP:** 14 Pages
	Second Review	May 18th, 2010	**TP:** 14 Pages
	Third Review	May 19th, 2010	**TP:** 14 Pages
	Fourth Review	May 20th, 2010	**TP:** 14 Pages
	Fifth Review	May 24th, 2010	**TP:** 14 Pages
	Sixth Review	May 25th, 2010	**TP:** 18 Pages
Third Group	First Review	August 10th, 2010	**PER:** 14th Pages
	Second Review	August 11th, 2010	**PER:** 14th Pages
	Third Review	August 12th, 2010	**PER:** 14th Pages
	Fourth Review	August 17th, 2010	**PER:** 14th Pages
	Fifth Review	August 18th, 2010	**PER:** 14th Pages
	Sixth Review	August 19th, 2010	**PER:** 14th Pages
	Seventh Review	August 24th, 2010	**PER:** 14th Pages
	Eighth Review	August 25th, 2010	**PER:** 14th Pages
	Ninth Review	August 26th, 2010	**PER:** 14th Pages

CHART 3.5. CAPTION

Caption
EDPL: Environmental Diagnosis of the Poopo Lake
RHRS: Retreatment of the Huanuni River Sediments
WP: Web Page
TP: Thesis Profiles
PER: Proposal of Environmental Remediation

The review was carried out in the following way: we read the Source text loudly and the Academic tutor was reading the Target Language text silently simultaneously, in order to compare them sentence by sentence. In this process, some mistakes were identified and technical terms or non familiar words were highlighted for further study of the accuracy of meaning.

After each session of review, the correction was carried out by us, based on the data collected in the review. The mistakes were solved; sometimes it was necessary to retranslate some words, sentences or paragraphs. Besides, the technical terms or non familiar words were looked up in specialized dictionaries in order to establish a proper equivalent. These corrections were submitted to review in the following meeting, thus, the translation into the target text was improved; hence the edition process was carried out.

b) Edition

After the texts were reviewed and corrected, the edition stage was started. Here, we had to read and re-review the source and target texts, considering: the equivalence of meanings, structures, writing, punctuation marks, and the presentation. Actually, this stage was very important because it was the last step before publishing the text for the spreading of the information.

This activity was developed the third week of March for the First Group, the last week of May for the Second Group, and the last 2 weeks of August for the Third Group.

2.3. THIRD STAGE

a) Translation Procedures Study

This stage lasted six weeks. It was carried out after the translation of the three groups of texts because the translations had to be delivered to the *Department of Postgraduate Studies and Scientific Research*; where as this activity had no interest for the institution for having a linguistic nature. Therefore, it was developed from the first week of September to the second week of October.

The most important step of this activity was the identification of the procedures used in the translation process. As the procedures were identified, they were listed in order to count the quantity of the procedures that were used.

b) Terminological Study

This stage was developed after selecting non-familiar words found in the translation process (the selection was carried out in Stage 1). These words were listed and left for further research; the features considered when listing the words were their grammatical category and the area or field they belonged to.

The list was copied into the Chart 3. The study was initiated looking up the definition of the words. This activity was carried out with the help of virtual dictionaries and some specialized web pages. Through this activity, it was possible to determine whether a word listed was a term or not. The confirmed terms were kept in the chart, meanwhile the words that were not terms were deleted. The source in which the definition was found was also saved. Furthermore, it was possible to confirm the area or subject field the terms belonged

to. In addition to that, the relevant features, such as synonyms or homonymy, were written in the box of Observations. After finding the definition, the etymological analysis was carried out with the help of etymological Dictionaries for a better understanding of the term. This Stage was carried out because it was very important to take time to carry out this stage carefully since the results were going to be the base of the terminology list.

Once all these steps were finished, we proceeded to compile the terms in an alphabetical order to build up the *Terminology*.

3. ACHIEVEMENTS

Thanks to the usage of the knowledge acquired at the *Department of Linguistics and Languages*, our translation competences were applied and improved all along the development of this *Supervised Work*.

Having finished this work, three achievements have been accomplished, which are listed as follows:

a) The translation as a product
b) The analysis of the Translation
c) Terminology

The translation as a product refers to a completed translation stage, it means the translated texts; the analysis of the translation refers to the analysis of the translation procedures that were used in the translation process, which were illustrated by using examples; and the terminology, which refers to the list of terms found in the source text. In other words, the objectives were achieved in the second and third stage of this *Supervised Work*.

In the following section, the analysis of the translation as well as the terminology is explained, since these two activities were developed based on the product of the translation which was already delivered to the head of the *Department of Postgraduate Studies and Scientific Research*.

3.1. ANALYSIS OF THE TRANSLATION

As it was mentioned above, the analysis of the translation was made in order to know which procedures were used in the translation process. It was carried out with the aim of comparing and analysing the translation by illustrating it showing the techniques used. Besides that, the analysis was carried out for establishing which procedure was the most used.

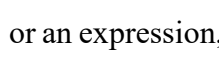
To clarify the way the analysis was made; it must be mentioned that the analysis was carried out according to Newmark's Text Analysis and procedures. In Chapter II, the parameters that were used to recognize the translation procedures in the translation process were mentioned. Besides, the procedures used throughout the translation process are mentioned, too, they were: Literal, Synonymy, Transposition, and Modulation.

It was stated above that in this *Supervised Work* a total of twenty-one documents were translated and that they were divided into three groups in order to develop the correction of the texts easily. In the analysis of the translation, the division of these three groups was not considered. All the examples presented were selected because they represented very well each of the procedures used in the translation.

Four examples of each procedure were meant to be analysed, but, in some cases, less or more examples were analysed. For instance, the Synonymy procedure had to be presented only once because there were

very few examples in the translation; whereas the Transposition Procedure presented five examples because there are two types of transposition, the grammatical and the syntactical.

Considering the previous explanations, the analysis was made as follows: each example was divided in four parts, the first one was the Text Analysis (function, style, register and tone), the second part was the source language text, the third part was the target language text and the fourth part contained the explanation of the analysis.

The texts to be analysed were paragraphs mainly, thus, the paragraphs were divided into sentences. The sentences were represented with numbers. To establish the equivalences, whether it was a word, a term, or an expression, some arrows ( ) and black braces () were used.

The Spanish syntactical features were presented with letters, boxes or braces coloured in blue and the grammatical features with red-coloured letters, curved lines and braces. The English syntactical features were presented with letters, boxes and braces coloured in green and the English grammatical features with purple-coloured letters, curve lines and braces.

3.1.1. LITERAL

> According to Newmark (1995, 101), in the literal translation the grammatical constructions of the source language are converted into the nearest target language equivalents. The following examples are presented to show the literal procedure:

Example 1.

It was taken from *Environmental Diagnosis of the Poopo Lake*, (Pages: Spa. 1, Eng. 2).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.6. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral –Technical
TONE: Neutral

Source Language:

1. La enorme contaminación por metales pesados se debe a que muchas empresas mineras que operan en el sector, no cumplen las normativas ambientales vigentes.

2. Asimismo, las aguas ácidas de mina y los pasivos ambientales mineros (desmontes y colas), generados en las décadas pasadas, no son tratados y no han sido estabilizados químicamente, respectivamente; por lo que, se constituyen en fuentes potenciales de ácidos y carga de metales pesados.

3. Finalmente, el Manejo de Cuencas no es adecuado.

Target Language:

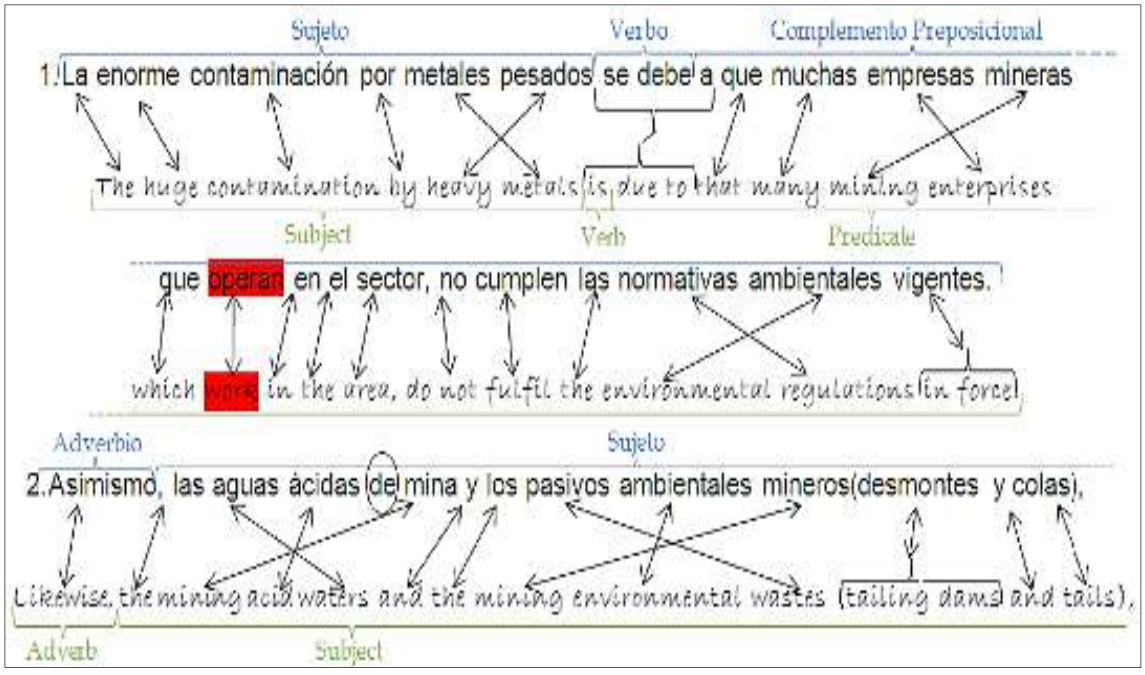
1. The huge contamination by heavy metals is due to that many mining enterprises which work in the area, do not fulfil the environmental regulations in force.

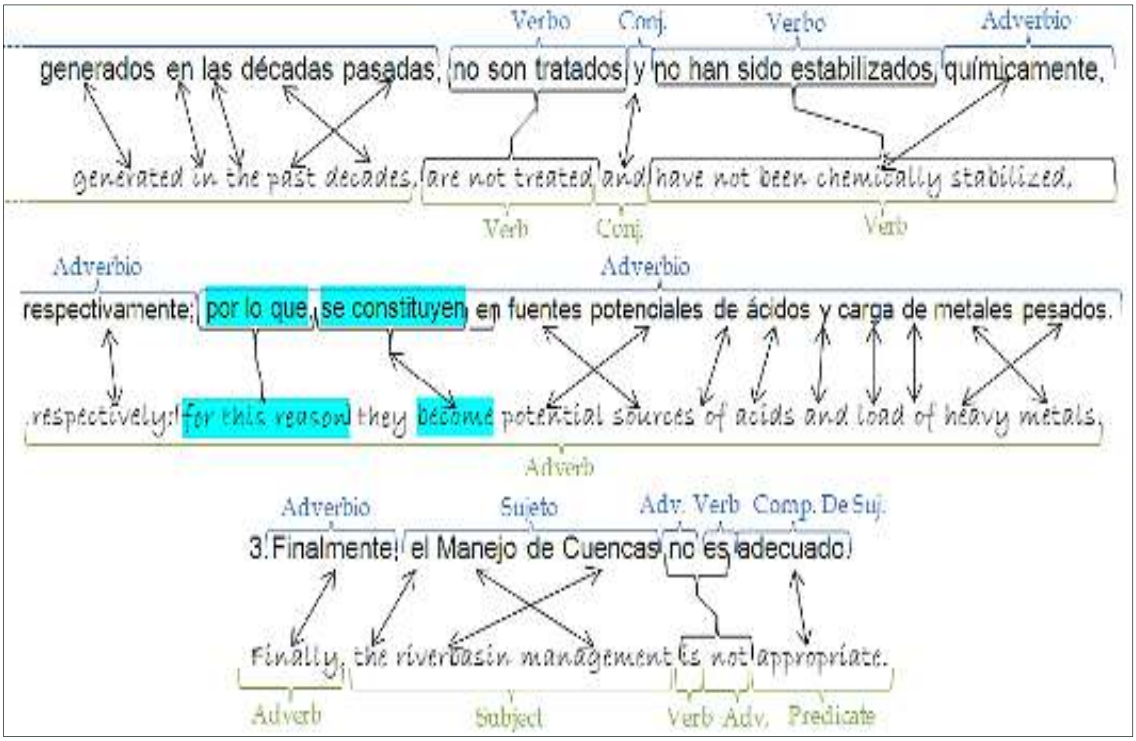
2. Likewise, the mining acid waters and the mining environmental wastes (tailing dams and tails), generated in the past decades, are not treated and have not been chemically stabilized, respectively; for this reason they become potential sources of acids and load of heavy metals.

3. Finally, the riverbasin management is not appropriate.

Analysis of the Translation Procedure:

FIGURE 3.2. LITERAL PROCEDURE 1





	Synonymy
	Transposition
	Modulation

In this example, it can be seen that the first sentence was translated literally, considering the basic shifting of the adjectives and nouns. This shift is usual when we are dealing with Spanish-English translation. The shiftings were from Spanish **noun-adjective** to English **adjective-noun**: from "metales pesados" to "heavy metals", from "empresas mineras" to "mining enterprises" and from "normativas ambientales" to "environmental regulations". In this sentence, the synonymy procedure was used replacing "work" with the word "operan" because the translation was more suitable for the equivalence of meaning. In the case of

"vigentes", the translation presented was "in force" rather than "valid" because it referred to the regulations, decrees or laws; therefore it was the best equivalent for it.

The second sentence presented five Spanish **noun-adjective** to English **adjective-noun** shiftings: from "pasivos ambientales mineros" to "mining environmental wastes", from "aguas ácidas de mina" to "mining acid waters", from "décadas pasadas" to "past decades", from "metales pesados" to "heavy metals", from "fuentes potenciales" to "potential sources", and once more from "metales pesados" to "heavy metals". This sentence also presented these two Modulations, the first case was "por lo que" that was translated in "for this reason"; and the second case was the **verb** "se constituyen". This **verb** should have been translated as "they set themselves as" but it did not express what the target text meant, so, "become" was chosen because it was closest to the target text meaning. Besides that, the pronoun "they" was used as subject of the **verb** "become" referring to the "mining acid waters and the mining environmental wastes"**.** The third sentence was completely translated using the literal procedure, it presented only one example of Spanish **noun-adjective** to English **adjective-noun** shifting:

from "manejo de cuencas" to "riverbasin management".

In conclusion, the entire paragraph followed the Spanish structure, only the order of adjectives was modified in order to have an adequate sentence structure in the target language, besides the Modulation was used in order to preserve the meaning of the source language into the target language.

Example 2.

Taken from *Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative*, (Pages: Spa. 18, Eng. 23).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.7. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical
TONE: Neutral

Source Language:

1. No será lo mismo con la fracción fina, -65 Mallas Tyler, que debe ser tratada para la recuperación de la casiterita y que debe contar con una etapa

de flotación de sulfuros para la recuperación de estos sulfuros usando reactivos.

2. La planta de tratamiento de estos finos debe considerar este aspecto para hacer un dique de colas de sulfuros hermético y una unidad de tratamiento de aguas para la descontaminación de reactivos principalmente xantatos y espumantes que son de uso muy generalizado en el área.

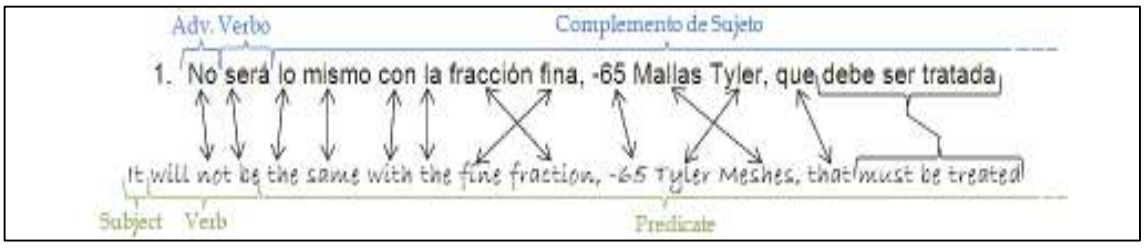
Target Language:

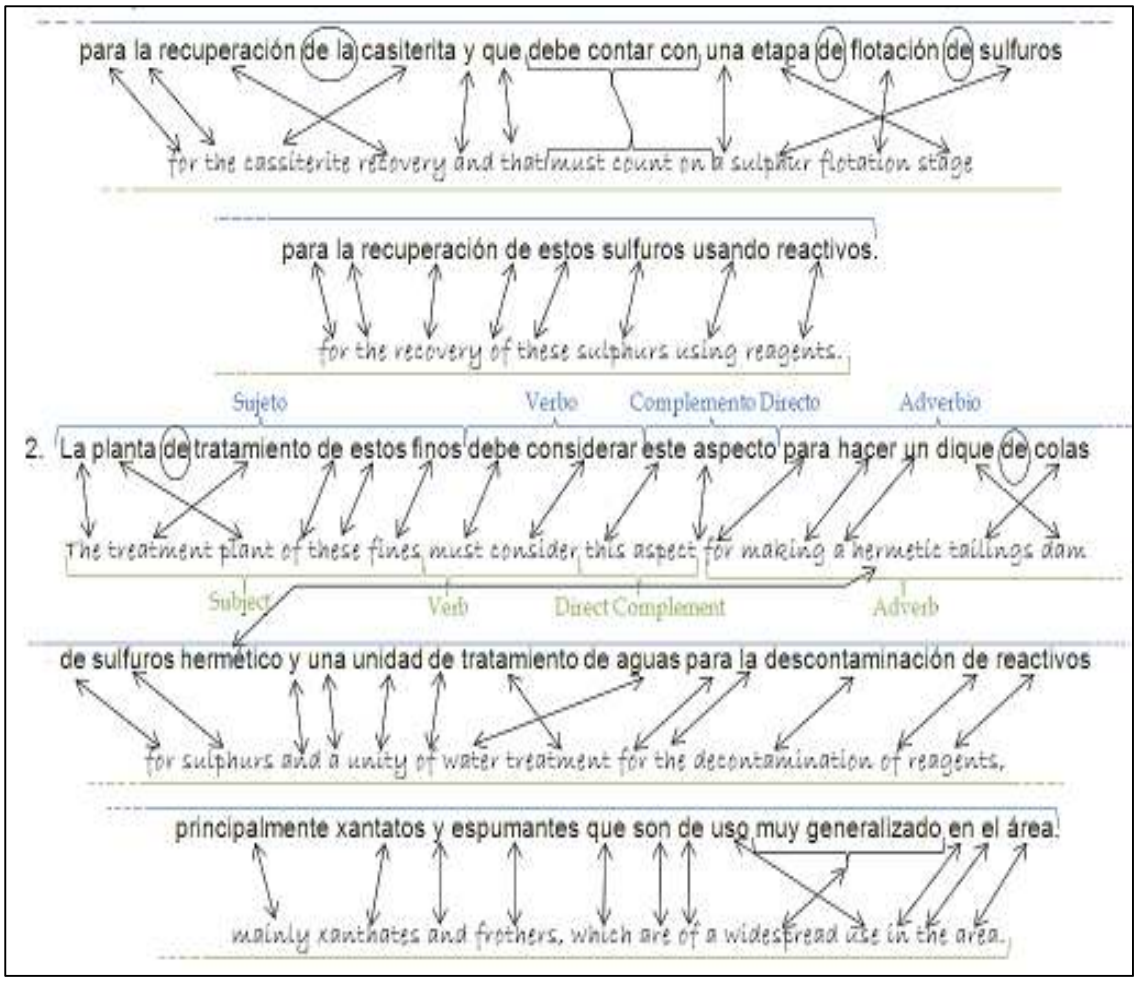
1. It will not be the same with the fine fraction, -65 Tyler Meshes, that must be treated for the cassiterite recovery and that must count on a sulphur flotation stage for the recovery of these sulphurs using reagents.

2. The treatment plant of these fines must consider this aspect for making a hermetic tailings dam for sulphurs and a unity of water treatment for the decontamination of reagents mainly xanthates and frothers, which are of a widespread use in the area.

Analysis of the Translation Procedure:

FIGURE 3.3. LITERAL PROCEDURE 2





This second example presents a literal translation, too. In the first sentence were two basic shiftings from the Spanish **Noun-Adjective** to the English **Adjective-Noun**, and two basic shiftings from the Spanish **Noun-Preposicional Phrase** to the English **Adjective-Noun**. This is usual when translating from Spanish into English. Consequently, the circled words, such as "de" or "de la" were deleted because their translation was no longer necessary. The shiftings were the following: from "Mallas Tyler" to "Tyler Meshes", from "fracción fina"

to "fine fraction", from "recuperación de la casiterita" to "cassiterite recovery", and from "etapa de flotación de sulfuros" to "sulphur flotation stage".

Aditionally, there was the presence of the subject "it" in the English sentence which referred to something stated in the previous paragraph of the text; this feature was not present in the Spanish sentence because not mentioning the subject is usual in Spanish, therefore it was a *Sujeto Tácito* or Implicit Subject. In the rest of the sentence, the literal translation is clearly present.

In the second sentence, the literal procedure is clear. It presents four basic shiftings: from "planta de tratamiento" to "treatment plant", from "dique de colas" to "tailings dam", from "tratamiento de aguas" to "water treatment", and from "uso muy generalizado" to "widespread use".

Example 3.

It was taken from *Thesis Profiles* (Pages: Spa. 42, Eng. 56).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.8. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical

TONE: Neutral

Source Language:

1. El debate sobre la sostenibilidad ha conducido a variados conceptos y criterios que en general reconocen como fundamental la participación cualitativa de los interesados en la discusión de la sostenibilidad y enfocan cuantitativamente los aspectos ambientales, sociales, económicos y de desarrollo.

2. En el caso de la minería boliviana, la discusión de la sostenibilidad se ha centrado en el escepticismo de considerar sostenible la explotación de un recurso no renovable y en la prevalencia de derechos indígenas sobre los yacimientos minerales.

3. Estas dos últimas consideraciones han llevado repetidas veces a imposibilitar la explotación de yacimientos minerales y a conflictos violentos.

Target Language:

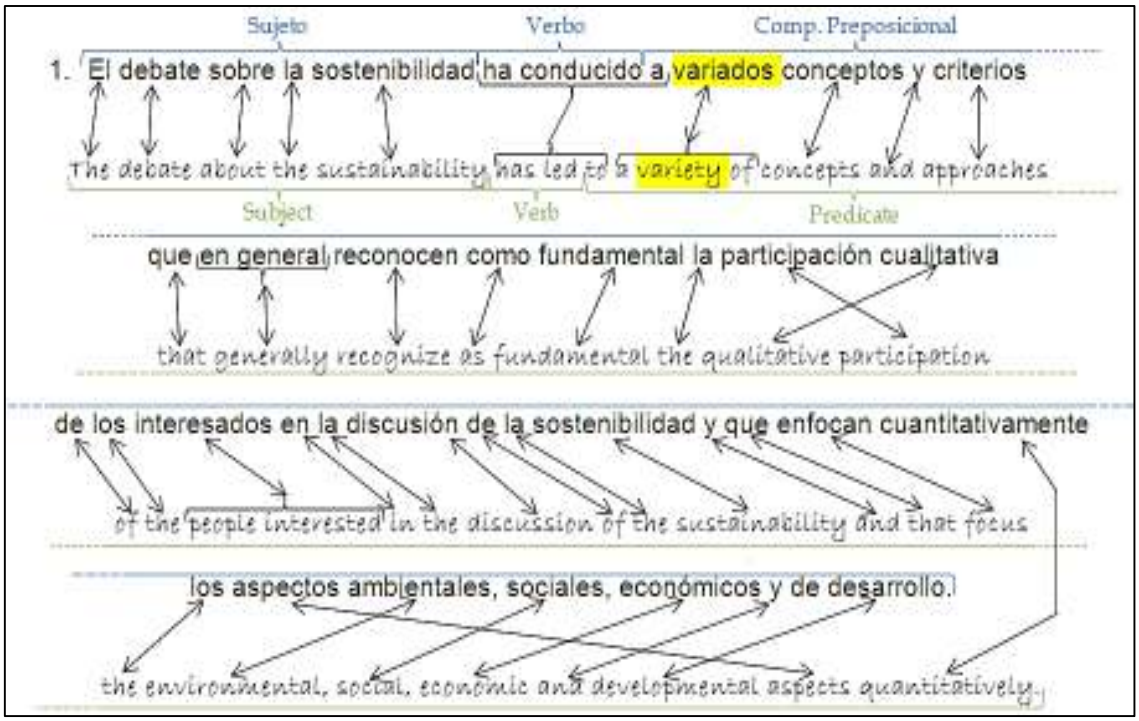
1. The debate about the sustainability has led to a variety of concepts and approaches that generally recognize as fundamental the qualitative participation of the interested ones in the discussion of the sustainability and that focus the environmental, social, economic and developmental aspects quantitatively.

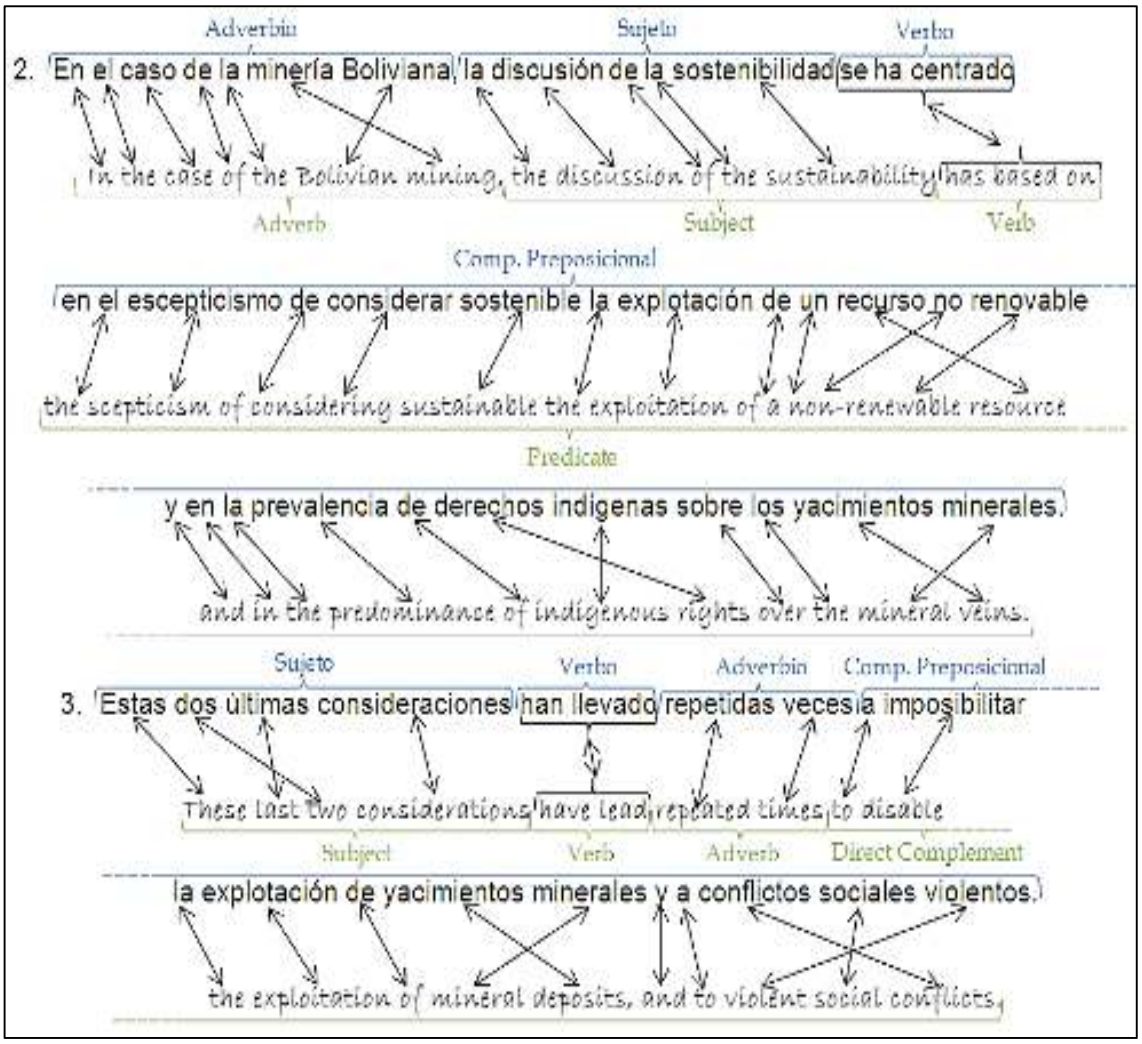
2. In the case of the Bolivian mining, the discussion of the sustainability has been centred on the scepticism of considering sustainable the exploitation of a non-renewable resource and the predominance of indigenous rights on the mineral veins.

3. Finally, the riverbasin management is not appropriate.

Analysis of the Translation Procedure:

FIGURE 3.4. LITERAL PROCEDURE 3





	Synonymy
	Transposition
	Modulation

In the third example, the whole paragraph was translated literally, considering the basic shifting of the adjectives and nouns. The first sentence presented two shiftings from Spanish **noun-adjective** to English **adjective-noun**: from "participacion cualitativa" to "qualitative participation" and from "aspectos ambientales, sociales, and económicos y de desarrollo" to "the

environmental, social, economic and developmental aspects". Besides the shiftings, a grammatical transposition was used, changing the **adjective** "variados" into the **noun** "variety".

The second sentence presented four **noun-adjective** to **adjective-noun** shiftings: from "minería Boliviana" to "Bolivian mining", from "recurso no renovable" to "non-recoverable resources", from "derechos indígenas" to "indigenous rights", and from "yacimientos minerales" to "mineral veins". This sentence did not present any other procedure.

The third sentence was completely translated using the literal procedure. As it is usual in the literal translation procedure, this sentence presented three cases of basic shifting: from "dos últimas consideraciones" to "last two considerations", from "yacimientos minerales" to "mineral deposits", and from "conflictos sociales violentos" to "violent social conflicts".

Example 4.

It was taken from *Thesis Profiles*, (Pages: Spa. 55, Eng. 74).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.9. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral -Technical
TONE: Neutral

Source Language:

1. La solución de algunos de los problemas actuales, como son el aumento de la población, la necesidad de una agricultura intensiva no destructiva, la seguridad en la producción y distribución de comida y energía, la gestión de suelos, el cambio climático y otros, imponen la necesidad de disponer de información inmediata, tanto a escala local como global.

2. En la actualidad, la teledetección se ha convertido en la única tecnología que permite la adquisición de la mayor parte de esta información de forma casi inmediata y para cualquier escala, ya que brinda una gran cantidad de datos geográficos, espaciales, espectrales, etc., de gran calidad (exactos, coherentes y veraces).

Target Language:

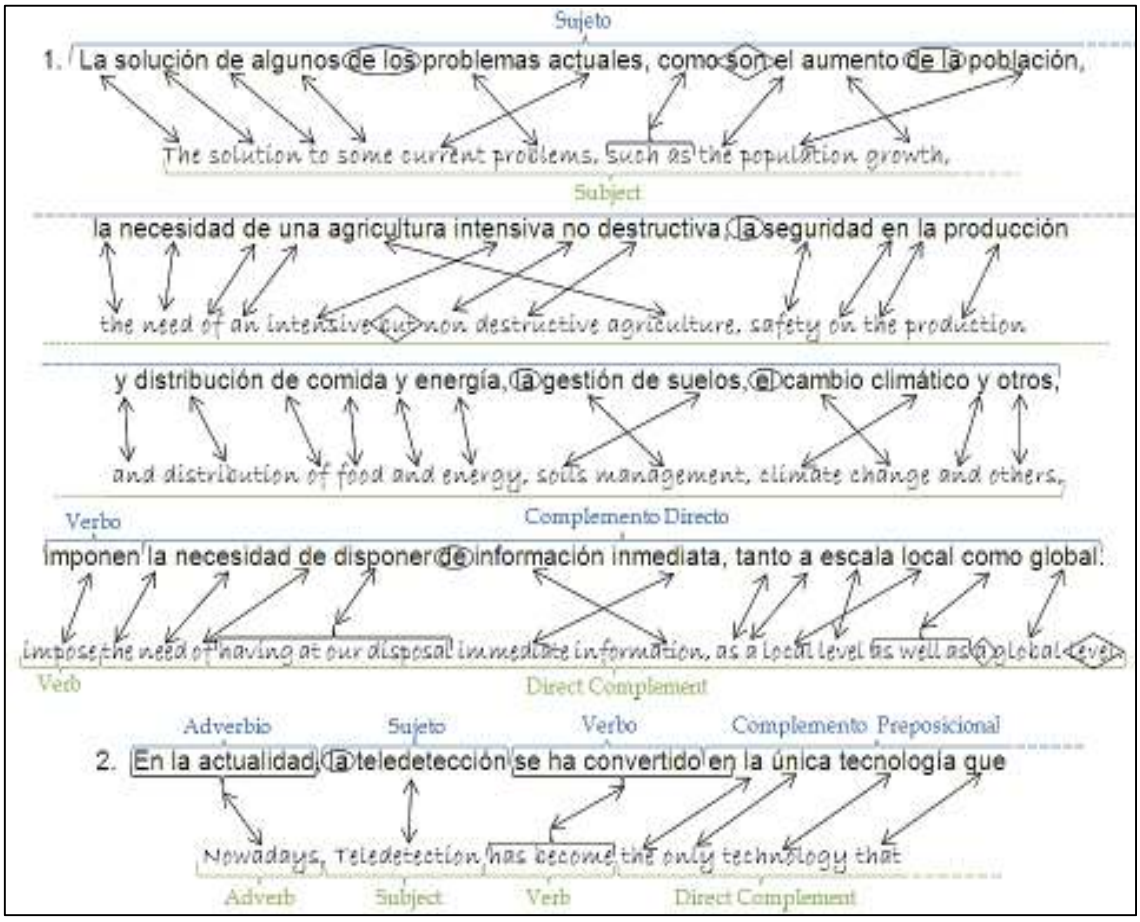
1. The solution to some current problems, such as the population increase, the need of an intensive but non destructive agriculture, the safety on the production and distribution of food and energy, soil management, climate change and others, impose the

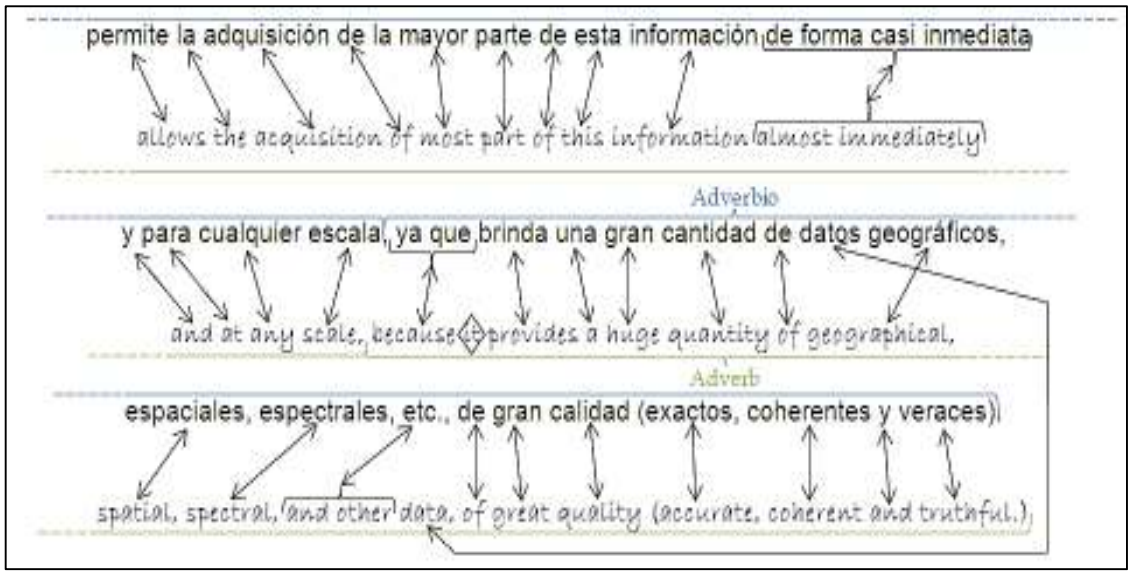
need of having at our disposal immediate information, as a local and a global level.

2. Nowadays, teledetection has become the only technology that allows the acquisition of most part of this information immediately and at any scale, because it provides a huge quantity of geographical, spatial, spectral, and other data, of great quality (accurate, coherent and truthful).

Analysis of the Translation Procedure:

FIGURE 3.5. LITERAL PROCEDURE 4





	Synonymy
	Transposition
	Modulation

In this example, it can be seen that the whole paragraph was translated literally, considering the basic shifting of the adjectives and nouns. In the first sentence, the shiftings were the following: from "problemas actuales" to "current problems", from "aumento de la población" to "population growth", from "agricultura intensiva no destructiva" to "intensive but non destructive agriculture", from "gestión de suelos" to "soil management" and from "cambio climático" to "climate change". The circled Spanish words were omitted because their use was not necessary in the translation of the English version, e.g. "de los", "de la", "la", "la", "el", "de". The English words in a (rhombus) ◇ were used needed to express better the meaning of the source text. For example, in the

expression "a global level", "a" and "level" was added to follow a parallelism in the structure.

The second sentence only one case of basic shifting: from "datos geográficos, espaciales, espectrales, etc., de gran calidad" to "geographical, spatial, spectral, and other data". The word "data" was used instead of "**etc**." because it did not need the use of a point. The **Pronoun** "it" in "…because it provides…" was added in order to keep the grammar rules in English, because in the Spanish version "…ya que brinda…" the subject was omitted, but that characteristic can not be performed in the English language.

3.1.2. SYNONYMY

According to Newmark (1995, 101), in the Synonymy procedure the translation follows the grammatical and syntactical structures, but some words are converted to the nearest synonym in order to present an accurate meaning in the target language. The following example is presented to show this procedure::

Example 1.

It was taken from *Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative*, (Pages: Spa. 18, Eng. 23)

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.10. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical
TONE: Neutral

Source Language:

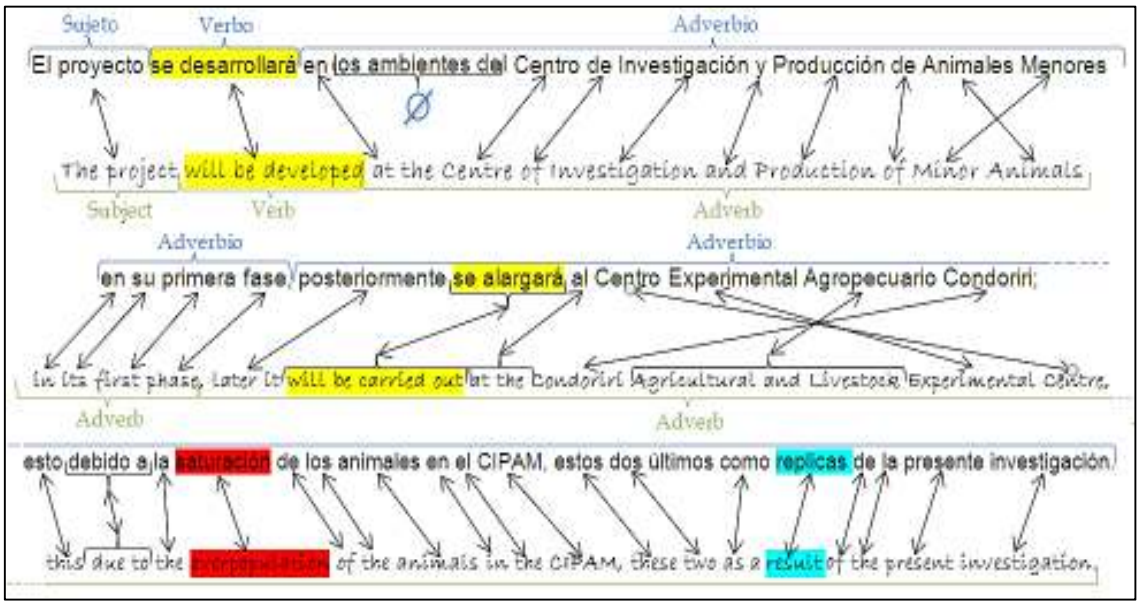
1. El proyecto se desarrollará en los ambientes del Centro de Investigación y Producción de Animales Menores en su primera fase, posteriormente se alargará al Centro Experimental Agropecuario Condoriri; esto debido a la saturación de los animales en el CIPAM, estos dos últimos como replicas de la presente investigación.

Target Language:

1. The project will be developed at the Centre of Investigation and Production of Minor Animals in its first phase, later it will be carried out at the Condoriri Agricultural and Livestock Experimental Centre, this due to the overpopulation of the animals in the CIPAM, these two as a result of the present investigation.

Analysis of the Translation Procedure:

FIGURE 3.6. SYNONYMY PROCEDURE



	Synonymy
	Transposition
	Modulation

The synonymy procedure had very few examples in the texts. The first example is presented here, and the second is presented in **Transposition Procedure** part. The sentence in which was the synonymy procedure was a better example for transposition.

The synonymy is highlighted in red in the previous picture. The word "saturación" was translated into "overpopulation" instead of "saturation". "Overpopulation" was chosen among the range because it fitted better to the meaning of "saturación" in the sentence.

The subject "**it**" in the English sentence referred to "the project". The paragraph presented two cases of basic shifting from the Spanish **noun-adjective** to English **adjective-noun**: from "Animales Menores" to "Minor Animals" and from "Centro Experimental Agropecuario Condoriri" to "Condoriri Agricultural and Livestock Experimental Centre".

Additionally, it also presented two Syntactical Transpositions and one case of Modulation. "Los ambientes de" was also omitted because the sentence was well understood without this part.

3.1.3. TRANSPOSITION

According to Bell (1991:70) *A transposition means the rendering of a source language element by a target language element which are semantically, but not formally equivalent*. There are two types of Transposition, the Grammatical and the Syntactical Transposition.

The grammatical transposition occurs when the source text word or expression that has a given grammatical category is changed in the target text for a different grammatical category. The Syntactical Transposition happens when the source text syntactical structure is changed in the target text for a different syntactical structure.

The following examples are presented to show this procedure:

Example 1. Grammatical Transposition

Taken from *Environmental Diagnosis of the Poopo Lake*, (Pages: Spa. 5, Eng. 8).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.11. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral – Technical
TONE: Neutral

Source Language:

1. A partir de la georeferenciación de las imágenes satelitales mostradas, se puede determinar que el área del espejo de agua del Lago Poopó en color amarillo que corresponde al mes abril de 1990, se presentaba una extensión de 2797.15 km2; y en el color azul que corresponde a julio del 2001, la extensión se vio disminuida a cerca de 2378.07 km2; es decir, se estableció una diferencia de 419.08 km2.

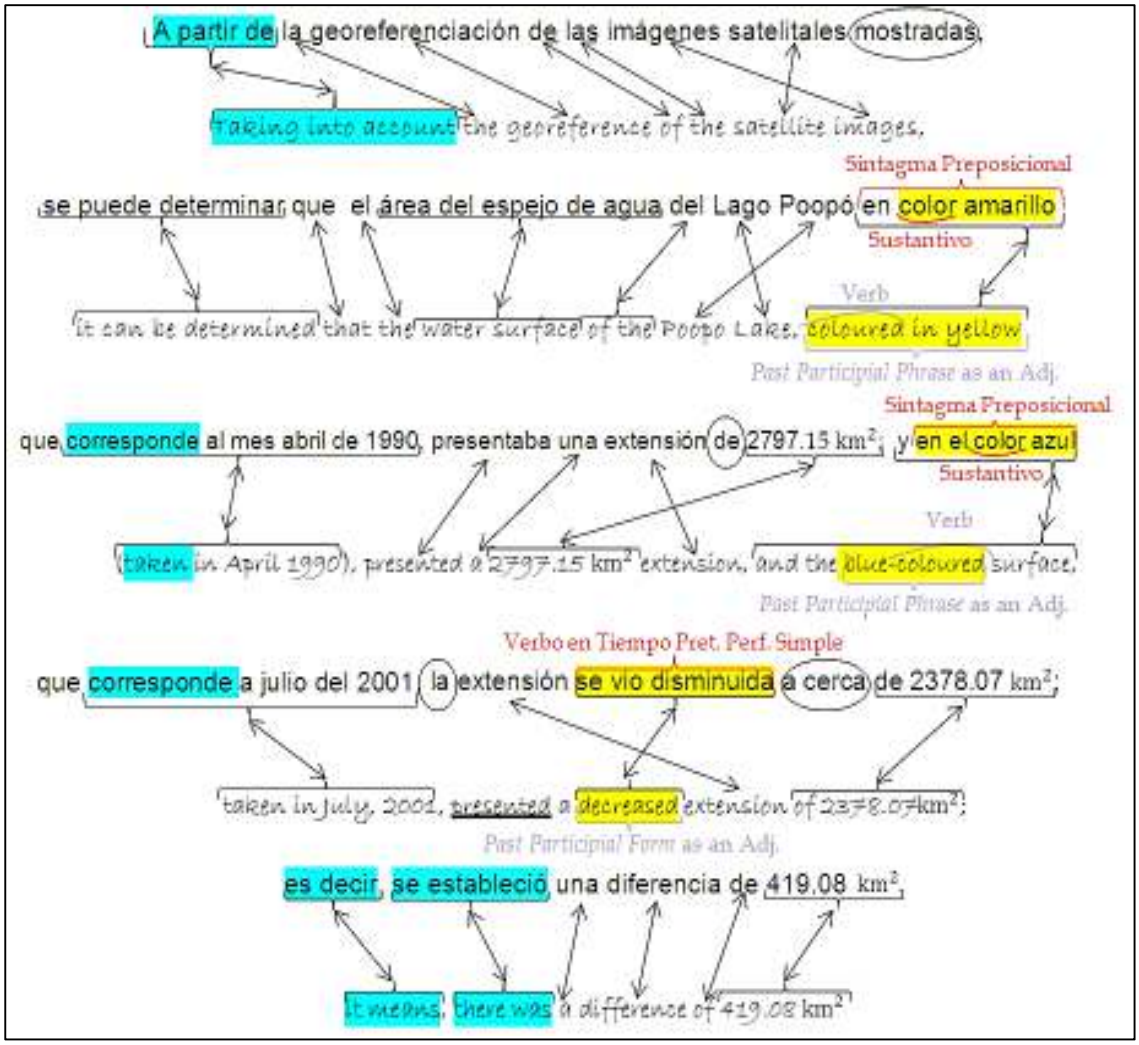
Target Language:

1. Taking into account the georeference of the satellite images, it can be determined that the water surface of the Poopo Lake, coloured in yellow (taken in April

1990), presented a 2797.15 km2 extension, and the blue-coloured surface, taken in July, 2001, presented a decreased extension of 2378.07 km2; it means, there is a 419.08 km2 of difference.

Analysis of the Translation Procedure:

FIGURE 3.7. GRAMMATICAL TRANSPOSITION PROCEDURE 1



	Synonymy
	Transposition
	Modulation

Image from the article *Environmental Diagnosis of the Poopo Lake*

This paragraph had only one sentence. Because of its complexity it was not possible to divide it into small sentences. For a better understanding, an image is presented on the left, since it was described in the source sentence.

The sentence presented five cases of grammatical transpositions. The first and the third ones were transpositions from **noun** to **verb**: the word "color" was changed into, the past participial form of the **verb** colour**:** "coloured", which is working in both parts as an adjective. The second and the fourth cases were transpositions inside the verb, from the **verb** "corresponde", conjugated in the Spanish present tense, to the present participial form of the English **verb** correspond**:** "corresponding". And the last one is a case of transposition from a **Verbal Phrase** "se vió disminuida" conjugated in the Spanish past tense to the participial form of the English **verb** decrease**:** "decreased" working as an **adjective**.

The last case of transposition was part of the use of a Modulation procedure, in which "presented" was introduced in order to have a parallelism in the comparison.

Besides, the sentence presented two shiftings from Spanish **noun-adjective** to English **adjective-noun**: from "imágenes satelitales" to "satellite images", and

from "una extensión de 2378.07km^2" to "a 2378.07 $\boldsymbol{km^2}$ extension". Besides, the circled words were not translated because they were not needed any longer.

Example 2. Grammatical Transposition

Taken from *Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative*, (Pages: Spa. 2, Eng. 4).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.12. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Technical – Neutral
TONE: Neutral

Source Language:

1. Regiones mineras como las que se encuentran en la cuenca de Sora Sora contienen cantidades apreciables de desmontes y colas o relaves, producto de actividades mineras.

2. Por largos periodos, incluyendo décadas, las colas del ingenio Santa Elena no fueron depositadas en diques de colas, de acuerdo a exigencias de las normas medioambientales.

3. Los efluentes provenientes del Ingenio Santa Elena fueron y son fuente de contaminación por

la concentración elevada de iones pesados y la permanente generación de drenaje ácido por la presencia de minerales sulfurados.

Target Language:

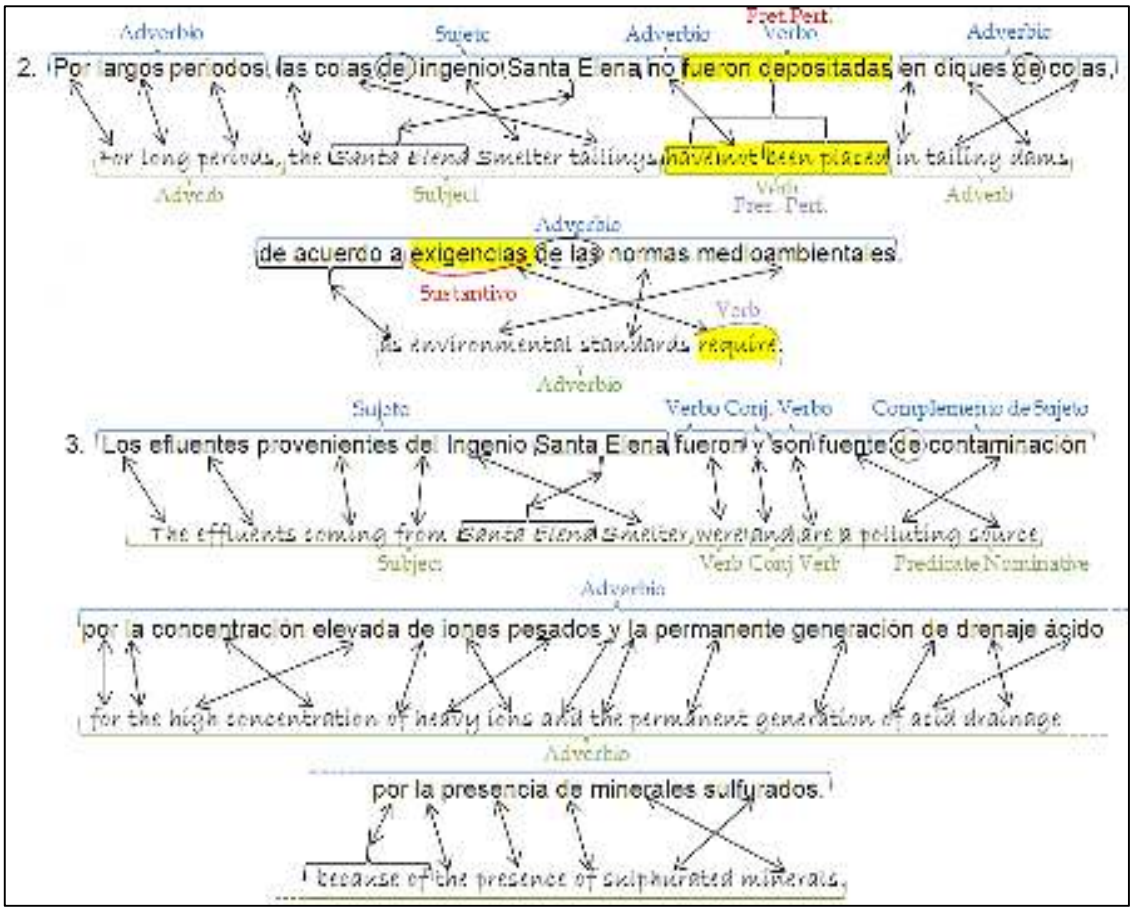
1. The mining regions, as those being in the Sora Sora basin, contain high quantities of mine wastes and tailings produced by the mining activities.

2. For long periods, the Santa Elena Smelter tailings have not been placed in dams as environmental standards require.

3. The effluents coming from Santa Elena Smelter were and are a polluting source for the high concentration of heavy ions and the permanent generation of acid drainage because of the presence of sulphurated minerals.

Analysis of the Translation Procedure:

FIGURE 3.8. GRAMMATICAL TRANSPOSITION PROCEDURE 2



	Synonymy
	Transposition
	Modulation

This paragraph had three examples of transposition. In the first sentence was the first case of grammatical transposition. The transposition was made from noun to **verb**: the Spanish **noun** "producto" was changed into the past participial form of the **verb** produce: "produced"; the literal translation "product" was not considered. The word "produced" is working as an adjective. The sentence also presented one case of Synonymy and two cases of Modulation, besides that, it also presented four

basic shiftings: from "regiones mineras" to "mining regions", from "Cuenca de Sora Sora" to "Sora Sora Basin", from "cantidades apreciables" to "high quantities", and from "actividades mineras" to "mining activities".

In sentence 2, the second and third grammatical transpositions occur: from one **verb** tense to other **verb** tense, and from **noun** to **verb**. In the second case the tense of the Spanish **verb** was *Pretérito Perfecto* "no fueron depositadas" and the English verb tense was Present Perfect "have not been placed". In the third case, the **Noun** "exigencias" apparently should have been translated into the noun "requirements" but was changed into the **verb** "require" conjugated in the Present Tense.

Additionally, the sentence presented three basic shiftings: from "colas del ingenio Santa Elena" to "Santa Elena Smelter tailings", from "diques de colas" to "tailing dams" and from "normas medioambientales" to "environmental standards".

The third sentence was translated literally. The only observation made was the six basic shiftings, that are the following: from "Ingenio Santa Elena" to "Santa Elena Smelter", from "fuente de contaminación" to "polluting source", from "concentración elevada" to "high concentration", from "iones pesados" to

"heavy ions", from "drenaje ácido" to "acid drainage", and from "minerales sulfurados" to "sulphured minerals".

Example 3. Syntactical Transposition

It was taken from *Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative*, (Pages: Spa. 17, Eng. 22).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.13. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical
TONE: Neutral

Source Language:

1. Tamaño de la planta: Cuanto menor es el contenido de un elemento valioso en el mineral, mayor debe ser el tonelaje tratado y por tanto mayor debe ser el tamaño de la planta para conseguir condiciones de rentabilidad.

2. No se puede pensar en tratar tonelajes menores a 5000 TPD, no sería rentable; este aspecto se analizará mas adelante.

3. También debe considerarse que al tratar un tonelaje importante de carga del lecho del río se obtendrá una cantidad interesante de por lo menos el 1.11% en peso de material sulfuroso y que solamente el 16% en peso, aproximadamente, debe ser tratado para la recuperación de la casiterita.

Target Language:

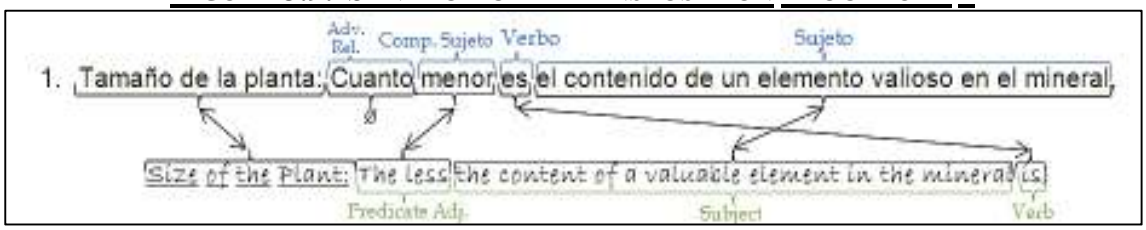
1. Size of the Plant: The less the content of a valuable element in the mineral, the more the treated tonnage must be, hence, the plant must be bigger enough to achieve profitability conditions.

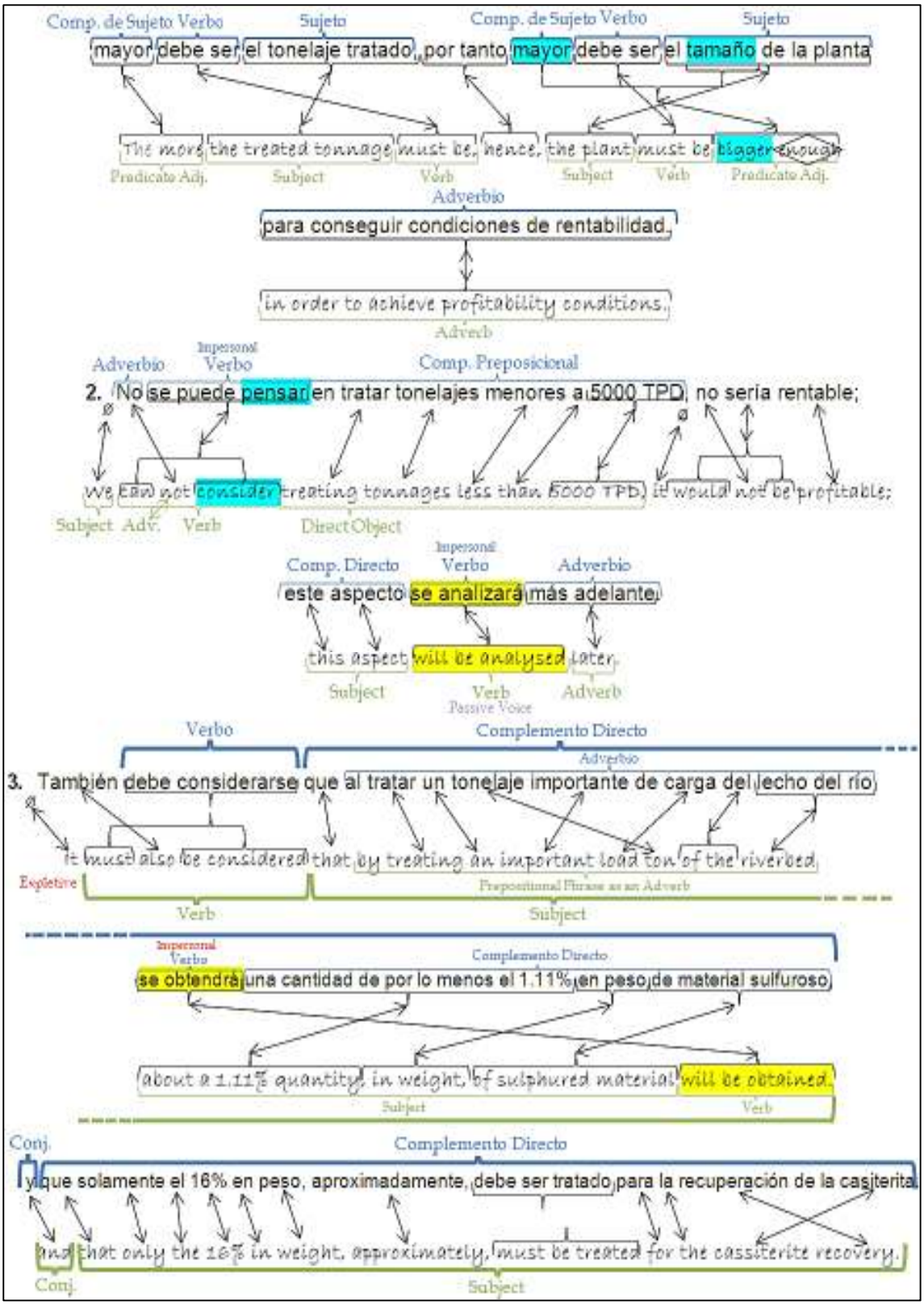
2. We can not consider treating tonnages less than 5000 TPD, it would not be profitable; this aspect will be analysed later.

3. It also must be considered that by treating an important charge ton of the river bed it will be obtained about 1.11% in weight of sulphured material and that only 16% in weight, approximately, must be treated for the cassiterite recovering.

Analysis of the Translation Procedure:

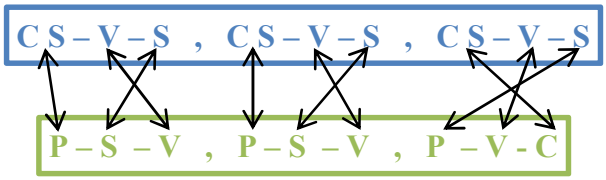
FIGURE 3.9. SYNTACTICAL TRANSPOSITION PROCEDURE 1




Comp. de Sujeto Verbo
Sujeto
Comp. de Sujeto Verbo
Sujeto
mayor debe ser el tonelaje tratado, por tanto mayor debe ser el tamaño de la planta
The more the treated tonnage must be, hence, the plant must be bigger enough
Predicate Adj. Subject Verb Subject Verb Predicate Adj.
Adverbio
para conseguir condiciones de rentabilidad.
in order to achieve profitability conditions.
Adverb
Adverbio
Impersonal Verbo
Comp. Preposicional
2. No se puede pensar en tratar tonelajes menores a 5000 TPD, no sería rentable;
We can not consider treating tonnages less than 5000 TPD, it would not be profitable;
Subject Adv. Verb Direct Object
Comp. Directo
Impersonal Verbo
Adverbio
este aspecto se analizará más adelante.
this aspect will be analysed later.
Subject Verb Adverb
Passive Voice
Verbo
Complemento Directo
Adverbio
3. También debe considerarse que al tratar un tonelaje importante de carga del lecho del río
It must also be considered that by treating an important load ton of the riverbed
Expletive Verb Subject
Prepositional Phrase as an Adverb
Impersonal Verbo
Complemento Directo
se obtendrá una cantidad de por lo menos el 1.11% en peso de material sulfuroso
about a 1.11% quantity, in weight, of sulphured material will be obtained.
Subject Verb
Conj.
Complemento Directo
y que solamente el 16% en peso, aproximadamente, debe ser tratado para la recuperación de la casiterita.
and that only the 16% in weight, approximately, must be treated for the cassiterite recovery.
Conj. Subject

	Synonymy
	Transposition
	Modulation

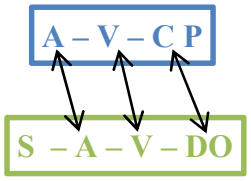
This paragraph was a bit complicated because it presented more than three Syntactical Transpositions. It also presented the basic shiftings that are made from Spanish into English. The first sentence presented a double comparative structure. In the following boxes the Spanish Clause Type is presented in the blue box to compare it with the English Clause Type that is in the green box:



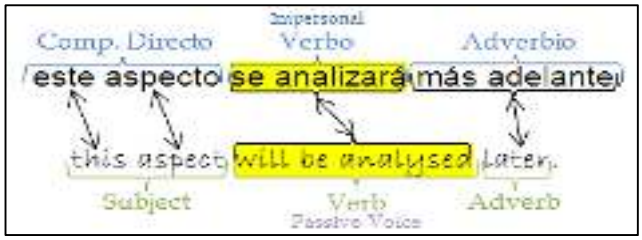
The double comparative in English always follows the structure **Comparative – Subject – Verb, Comparative – Subject – Verb**; therefore, the Syntactical Transposition was forced. In the case of the third part of the sentence, a Modulation was used and the clause followed the common model **Subject – Verb - Predicate** to avoid dividing the sentence.

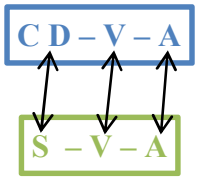
In the second sentence there are two different types of transposition. The first one is a transposition of a Spanish Impersonal sentence, which is characterised for not having a subject, nor explicit or implicit, into an English sentence with subject. Besides that, in this part a Modulation was also needed. In the following boxes are

the Spanish Clause Type (blue) and the English Clause Type (green).



The second type is a transposition from an Impersonal Spanish sentence into a Passive voice sentence in English. As it was mentioned before, the Spanish impersonal sentence does not have and can not have a subject. In the following boxes are the Spanish Clause Type (blue) and the English Clause Type (green) of the second part of the sentence.



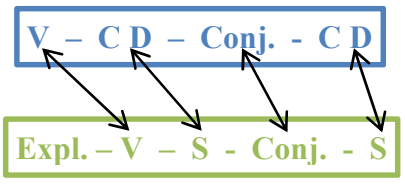


Although the English equivalents are in the same place as in the Spanish structure, there was a transposition because in the **Passive Voice** the **Direct Complement** of the **Active Voice** becomes the subject in the passive voice, besides the **verb** is used with a form of the **verb** *"to be"*.

In the third sentence there are two Syntactical Transpositions. The sentence is a complex one, so, one of the transpositions is in the main sentence and the other is in a clause. The Spanish Main sentence is an impersonal sentence and the English one is a sentence that has the **Expletive** "it" in its structure.

According to Wikipedia, **Expletives** are words that perform a syntactic role but contribute nothing to meaning[23]; in this case, the **Expletive** "it" had the function of indicating that the **subject** will follow the **verb**. They are usually used in the construction of impersonal sentences in English.

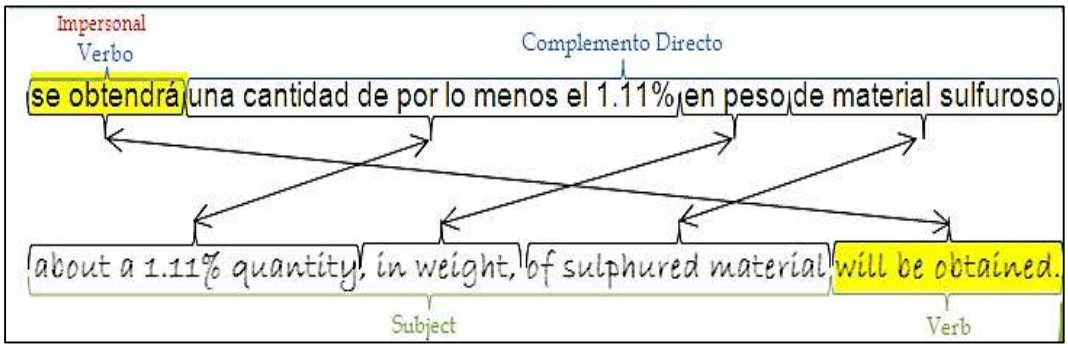
The Spanish Clause Type (blue) of the main sentence and the English Clause Type (green) are shown in the following boxes.

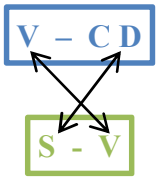


[23] http://en.wikipedia.org/wiki/Syntactic_expletive

Inside the first **Direct Complement** is the second case of transposition, the Spanish Clause is impersonal, and the English Clause was transposed into the passive voice.

The Spanish Clause Type (blue) of the main sentence and the English Clause Type (green) are shown in the following boxes.





Example 4. Syntactical Transposition

It was taken from *Thesis Profiles*, (Pages: Spa. 45, Eng. 52).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.14. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical
TONE: Neutral

Source Language:

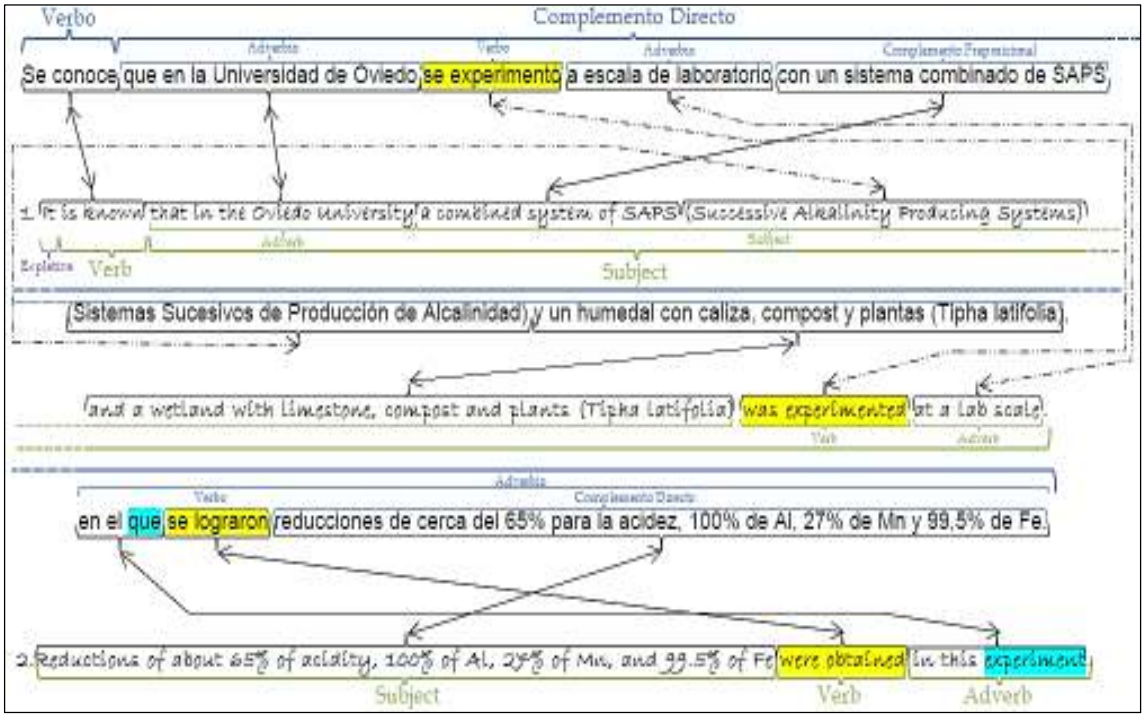
1. Se conoce que en la Universidad de Oviedo se experimentó a escala de laboratorio con un sistema combinado de SAPS (Sistemas Sucesivos de Producción de Alcalinidad) y un humedal con caliza, compost y plantas (Tipha latifolia), en el que se lograron reducciones de cerca del 65% para la acidez, 100% de Al, 27% de Mn y 99,5% de Fe.

Target Language:

1. It is known that in the Oviedo University a combined system of SAPS (Successive Alkalinity Producing Systems) and wetland with limestone, compost and plants (Tipha latifolia) was experimented at a lab scale. Reductions of about 65% of acidity, 100% of Al, 27% of Mn, and 99.5% of Fe were obtained.

Analysis of the Translation Procedure:

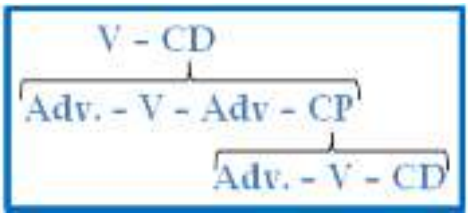
FIGURE 3.10. SYNTACTICAL TRANSPOSITION PROCEDURE 2

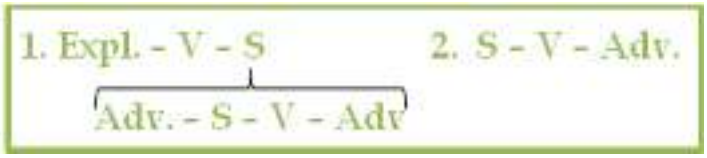


	Synonymy
	Transposition
	Modulation

This example had only one sentence in Spanish, but in the translation the sentence was divided in two English sentences because it was considered necessary to have a better English structure. There are two cases of Syntactical Transposition in the translation, one case of Modulation, and the regular basic shiftings from Spanish into English structures.

To illustrate better the procedure, the Spanish Clause Type is presented in the blue box to compare it with the English Clause type that is in the green box:



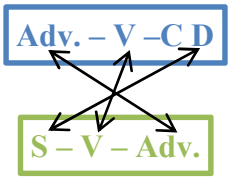


Inside the Spanish Main Sentence was a complex one. A **Direct Complement** Nominal Clause was found inside the main sentence; additionally, a **Prepositional Complement** Nominal Clause was found inside the in the **Direct Complement** Nominal Clause.

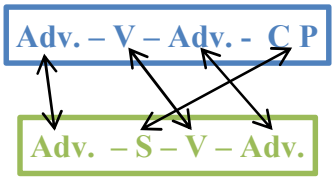
The first part of the sentence until the **Direct Complement** Nominal Clause was translated as the second main sentence in English; it was composed by an **Expletive** "It", the **Verb** and the **Subject**. The **Expletives** are not exactly part of speech, they are words that perform a syntactic role but contribute nothing to meaning; in this case, it had the function of indicating that the subject will follow the **verb**.

The first case of transposition was found in the **Direct Complement** Nominal Clause. The Spanish impersonal form "se experimentó" was translated into the Passive Voice form "was experimented". Besides that, other transposition in the **Direct Complement** was found; the

whole structure inside this part was changed, as shown in the following boxes:



The next transposition was found in the **Prepositional Complement** Nominal Clause. This is also a case of a transposition from the Spanish Impersonal Form "se lograron" to the English Passive Voice "were obtained". This part was divided in the English translation; it is presented as a separated sentence. The following boxes will compare the structure of the Spanish **Prepositional Complement** Nominal Clause with the English second main sentence.



A modulation was also found in this sentence, the Spanish "en el que", which was introducing the adverbial clause, was translated into "in this experiment" playing with a logical combination because the word "experimento" was never used in the Spanish version, but the whole sentence expressed that idea. Besides that, this part was working as an adverb at the beginning of the Spanish clause and was transposed to the end in the English sentence.

Example 5. Syntactical Transposition

It was taken from *Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative*, (Pages: Spa. 5, Eng. 6).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.15. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical
TONE: Neutral

Source Language:

1. Una vez realizadas las tres actividades macro de Diagnóstico Socioeconómico y Ambiental; Caracterización de los sedimentos y Pruebas Experimentales de Tratamiento de sedimentos por Concentración Centrífuga), se realizó el Estudio Técnico, Económico y Ambiental donde se estudio el Diseño del Flujograma, Dimensionamiento de equipos, Cálculo de costos directos e indirectos (indicadores) y la Evaluación de Impactos Ambientales.

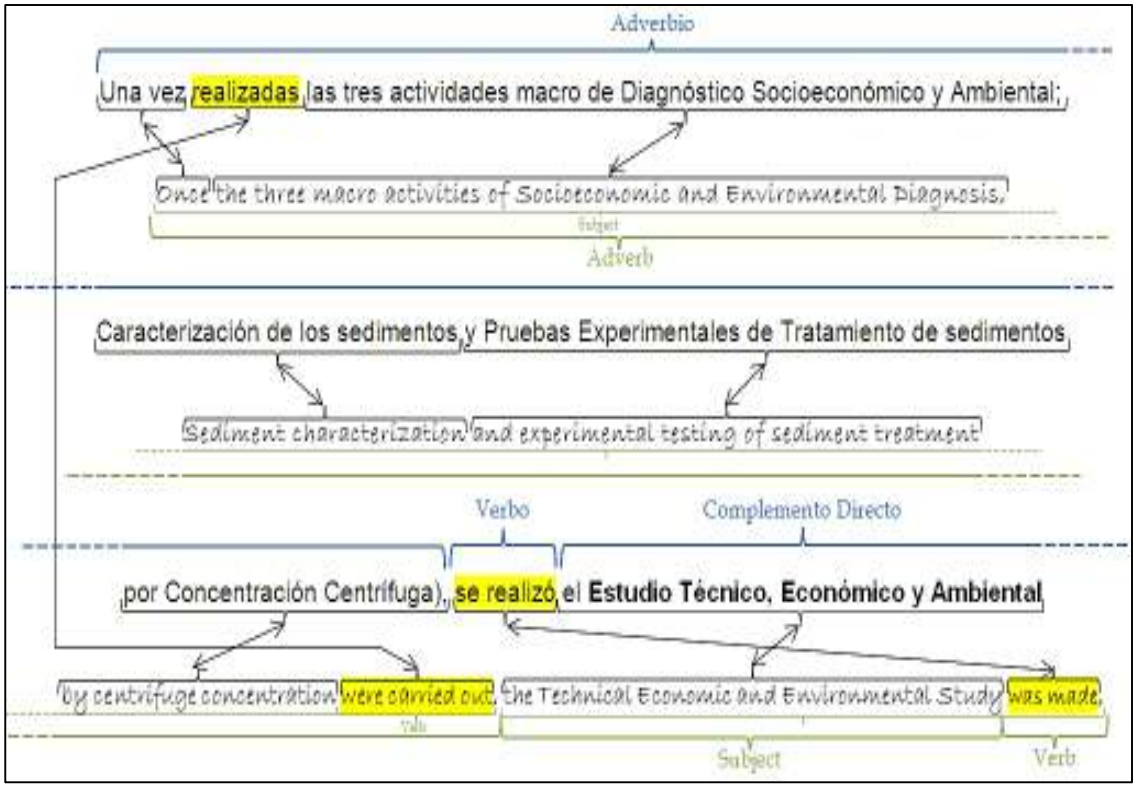
Target Language:

1. Once the three macro activities of socioeconomic and environmental Diagnosis, Sediment

characterization and experimental testing of sediment treatment by Centrifuge concentration were carried out, the Technical Economic and Environmental Study was made, where the Flowchart Design, Equipment Sizing, Calculation of direct and indirect costs (indicators) and Environmental Impact Assessment were studied.

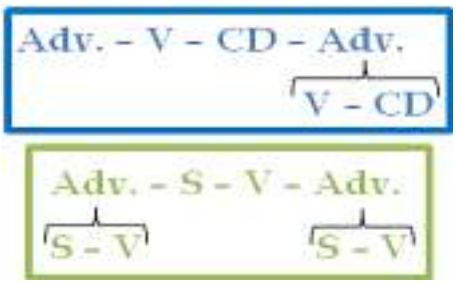
Analysis of the Translation Procedure:

FIGURE 3.11. SYNTACTICAL TRANSPOSITION PROCEDURE 3



	Synonymy
	Transposition
	Modulation

This paragraph had one sentence only. In the following boxes the Spanish Clause Type is presented in the blue box to compare it with the English Clause type that is in the green box:



In the Spanish sentence the presence of an Adverbial Clause can be seen; meanwhile in the English translation there are two Adverbial Clauses. This example has three transpositions in its structure, and some basic shiftings.

The first transposition is grammatical. The participial **verb** "realizadas", which is working as an **adjective** in the sentence, was transposed to the conjugated **verb**

"were carried out", a Passive Voice tense. Because of this transposition, a syntactical one was forced. The structure of the Spanish Phrase included the **adjective** "realizadas" and was before the **noun**, **Adj. – Noun**, but, since it was changed into a verb, the noun came first, resulting in the following structure: **Noun – Verb**.

The second transposition was made from the Main Spanish sentence, which was Impersonal sentence. The impersonal **verb** "se realizó" was changed into the English **verb** "was made", following the *Passive Voice* structure.

The last transposition was made inside the Spanish **Direct Complement**, and was also transposed from an Impersonal Spanish sentence into a Passive Voice sentence in English. The Spanish Impersonal sentences usually lack of subject; that is the case of the impersonal **verb** "se estudió". That **verb** was changed into the Passive Voice **verb** "was made", having a forced Syntactical transposition: from **Verb– Direct Complement** to **Subject – Verb.**

In addition to the transposition procedures, a variety of basic shiftings was developed, for example, from "actividades macro" to "macro activities", from "Diagnóstico Socioeconómico y Ambiental" to "Socioeconomic and Environmental Diagnosis", from "Caracterización de los sedimentos" to "Sediment

Characterization", and many others found in the sentence.

3.1.4. MODULATION

According to Bosco (2011) *Modulation consists of using a phrase that is different in the source and target languages to convey the same idea*. It means that there are changes in the grammar and syntax, but it still means what the source text was aimed to say.

Example 1.

Taken from *Plan of Environmental Remediation: Treatment of the Sediments of the San Juan de Sora Sora River Basin as a Local Development Alternative*, (Pages: Spa. 4, Eng. 7).

Text Analysis:

The paragraph presented the following Text Analysis:

CHART 3.16. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral
TONE: Neutral

Source Language:

1. El problema ambiental en toda la Cuenca de Sora Sora es extremadamente complicado, su remediación constituye un desafío que debe

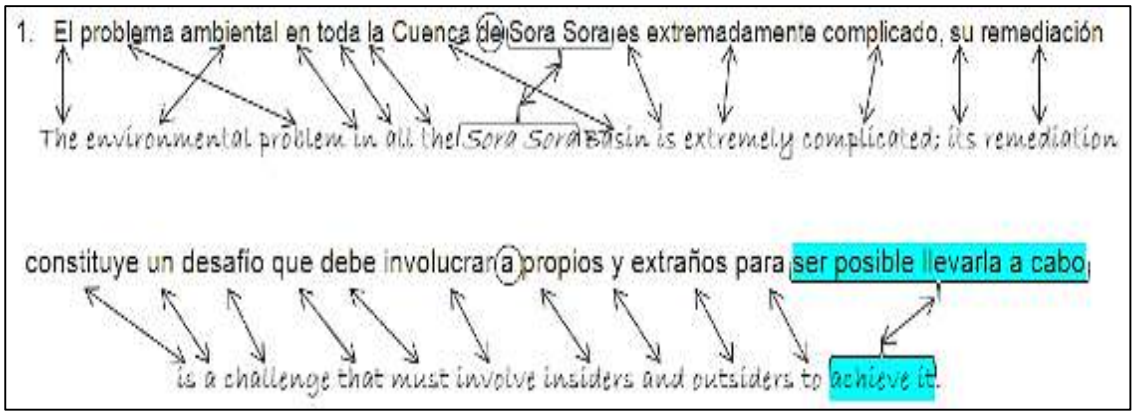
involucrar a propios y extraños para ser posible llevarla a cabo.

Target Language:

1. The environmental problem in all the Sora Sora Basin is extremely complicated; its remediation is a challenge that must involve insiders and outsiders to achieve it.

Analysis of the Translation Procedure:

FIGURE 3.12. MODULATION PROCEDURE 1



	Synonymy
	Transposition
	Modulation

In this sentence, the Modulation was made with "para ser posible llevarla a cabo" that was translated as "to achieve it". This procedure was needed because if this part was translated literally the target language would have not expressed what the source language was intended to mean.

Example 2.

This example was taken from *Web Page*, (Pages: Spa. 11, Eng. 16).

Text Analysis:

The paragraph presented the following text analysis:

CHART 3.17. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral -Technical
TONE: Neutral

Source Language:

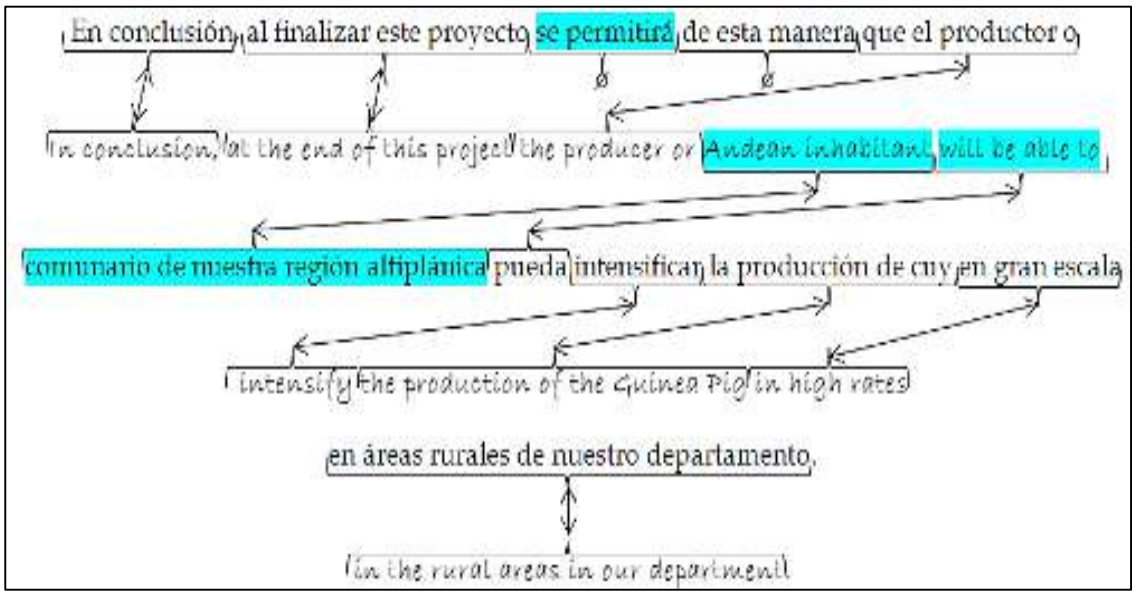
1. En conclusión, al finalizar este proyecto se permitirá de esta manera que el productor o comunario de nuestra región altiplánica pueda intensificar la producción de cuy en gran escala en áreas rurales de nuestro departamento..

Target Language:

1. In conclusion, at the end of this project the producer or Andean inhabitant will be able to intensify the production of the Guinea Pig in high rates in the rural areas in our department.

Analysis of the Translation Procedure:

FIGURE 3.13. MODULATION PROCEDURE 2



	Synonymy
	Transposition
	Modulation

In this sentence, the Modulation was really needed, because in the Spanish text the author used some expressions to emphasise the sentence using the impersonal sentence "se permitirá de esta manera". In the translation the future tense was kept but the **Direct Complement** "Productor" was placed as the subject of the sentence. Also, the expression "comunario de nuestra region altiplánica" was translated as "Andean inhabitant". If it was translated literally the target text would have been redundant.

Example 3.

It was taken from *Technical, Socioeconomic and Environmental Proposal for Polluted River Sediment Treatment as an Alternative of Environmental Remediation and Local Economic Development*, (Pages: Spa. 4, Eng. 4).

Text Analysis:

The paragraph presented the following text analysis:

CHART 3.18. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral
TONE: Neutral

Source Language:

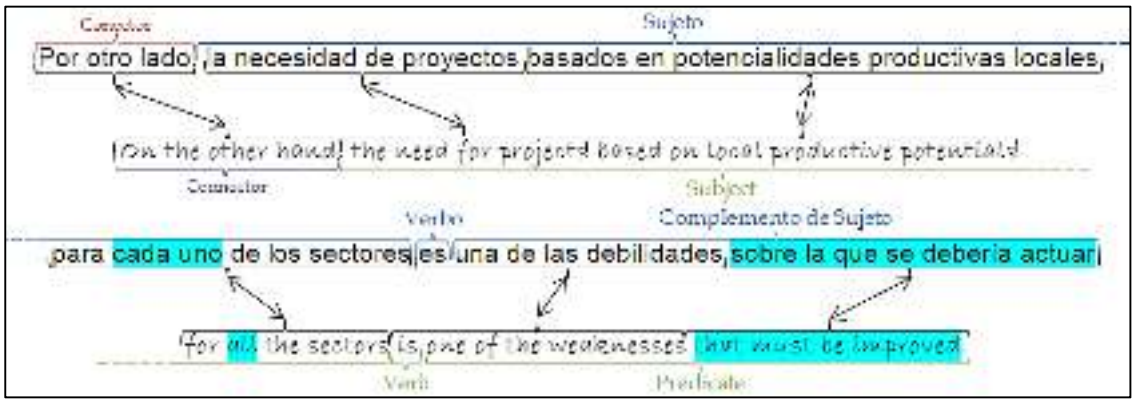
1. Por otro lado, la necesidad de proyectos basados en potencialidades productivas locales para cada uno de los sectores es una de las debilidades sobre la que se debería actuar.

Target Language:

1. On the other hand, the need for productive projects based on local potentials for all the sectors is one of the weaknesses that must be improved.

Analysis of the Translation Procedure:

FIGURE 3.14. MODULATION PROCEDURE 3



	Synonymy
	Transposition
	Modulation

In this sentence, the Modulation Procedure was used twice. In the Spanish text the author used some expressions that were changed to keep the meaning in the target text. The first Modulation was made in "cada uno" that was translated as "all". As it was mentioned before, the Modulation procedure deals with meaning, it means that other words were used to retell, in this case, the Spanish text into the English text.

In this first example "each one" could have been used but "all" was used instead, which has exactly the same meaning, but it does not follow the grammatical category or the structure; "each one" is composed by two words, and "all" only by one. The second Modulation was made in "es una de las debilidades" y "sobre la que se debería actuar" was translated as "is not an strength" "therefore, it must be improved"

because it expressed the same idea with a different logic, affirmative into a negative statement; if the Literal Procedure would have been used, the text would have been a bit weird.

Example 4.

The fourth example was taken from *Technical, Socioeconomic and Environmental Proposal for Polluted River Sediment Treatment as an Alternative of Environmental Remediation and Local Economic Development*, (Pages: Spa. 5, Eng. 6).

Text Analysis:

The paragraph presented the following text analysis:

CHART 3.19. TEXT ANALYSIS

FUNCTION: Informative
STYLE: Descriptive
REGISTER: Neutral - Technical
TONE: Neutral

Source Language:

1. En primera instancia se debe mencionar que cualquier Proyecto de Remediación Ambiental implica una serie de gastos, generalmente gastos no reembolsables.

2. Desde esa perspectiva, es conveniente señalar que no existirán ingresos para las comunidades y pobladores afectados por la contaminación, salvo

en casos excepcionales como el hecho de que algunos se dediquen a extraer el mineral de estaño de los sedimentos en condiciones precarias y difíciles, pero que de todos modos lograrán un ingreso mínimo de subsistencia.

3. ¿Cuánta gente se puede ocupar de esta actividad?

4. Muy pocos, esta situación ya puede ser observada en la actualidad y se puede contar con los dedos de la manos los que están trabajando a lo largo del río Japo - Payrumani.

Target Language:

1. Firstly, it must be mentioned that any Environmental Remediation Project implies a series of expenses, generally non-refundable.

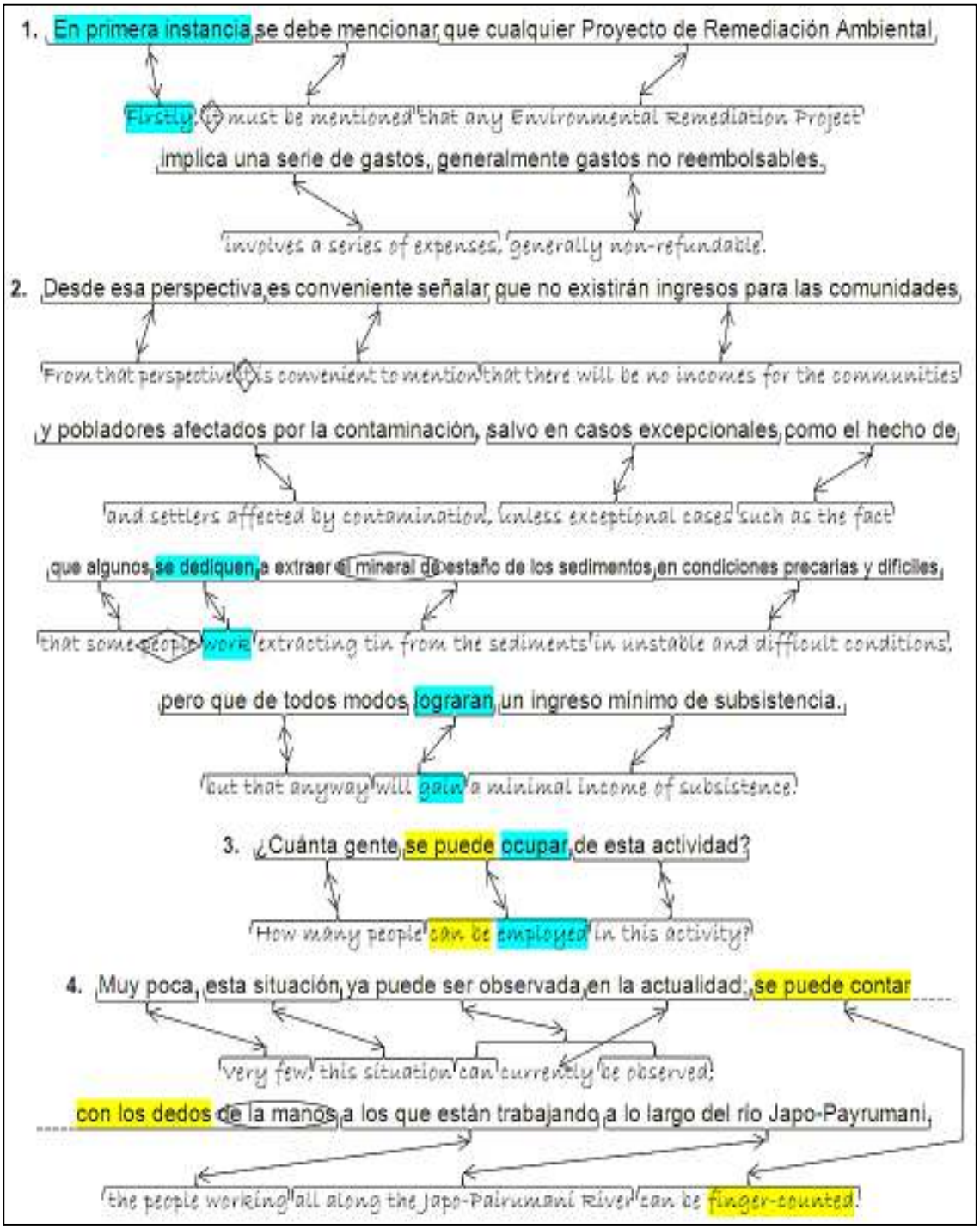
2. From that perspective it is convenient to mention that there will be no incomes for the communities and settlers affected y contamination, unless exceptional cases such as the fact that some people work extracting tin from the sediments in unstable and difficult conditions, but that anyway will gain a minimal income of subsistence.

3. How many people can be employed in this activity?

4. Very few, this situation can currently be observed and the people working all along the Japo-Pairumani River can be finger-counted.

Analysis of the Translation Procedure:

FIGURE 3.15. MODULATION PROCEDURE 4



	Synonymy
	Transposition
	Modulation

The fourth example is a paragraph composed of four sentences. There are exactly four cases of Modulation and two cases of Transposition in this paragraph. The sentence number one presents the first case of Modulation: "En primera instancia" was translated into "Firstly". Also, it presents the "It" **Pronoun** that was added to have a good syntactical English structure since the source text structure had a ***Tacit Subject***, which is very common in Spanish.

In the second sentence, two Modulations were found, the first was made from "se dediquen" into "work", and the second from "lograrán" to "gain". The circled words "el mineral de" was deleted because it was redundant to use it in the target text. The words "it" and "people" were added to the sentence. "It" was added to have a correct English structure and "people" was needed to grasp the meaning of the Spanish word "algunos", which was translated into "some people".

The third sentence had one case of transposition, and inside it presented a Modulation. "Se puede ocupar" is an impersonal Verbal Syntagma in the Active Voice that was translated into "can be employed", an English Passive Voice form. Also, the verb "ocupar" was translated as "employed" and not as "occupied"

because "employed" had a closer English meaning to what the Spanish verb had.

The last sentence presents a Syntactical Transposition. In the second part of the sentence, after the *Semi Colon* (;), the Spanish structure **V – A – CP – A** was transposed to the English structure **S – V – P**, this happened because the Spanish sentence was impersonal, and the English one had to be translated in the Passive voice. Besides that, inside the Syntactical Transposition, there is another transposition procedure. The Spanish verb of the second part of the sentence "se puede contar" is modified by an adverb "con los dedos de las manos", this was transposed in the English version, converting the Spanish verb and adverb into a verb only: "can be finger-counted". If the Literal Procedure would have been used, the target text would not have been natural.

3.2. TRANSLATION PROCEDURES

In the previous section the translation procedures were exemplified, but in this Supervised Work, their rate of use was also considered. In this one, the quantity of techniques is presented in Charts and Figures.

Firstly, it must be remarked that four procedures of translation were identified: Literal, Modulation, Synonymy, and Transposition. The Literal procedure was not taken into account because the whole translation was based on it. The other three procedures were used in case the Literal procedure was not enough to carry out a good translation. Considering these facts, the three procedures were listed and counted.

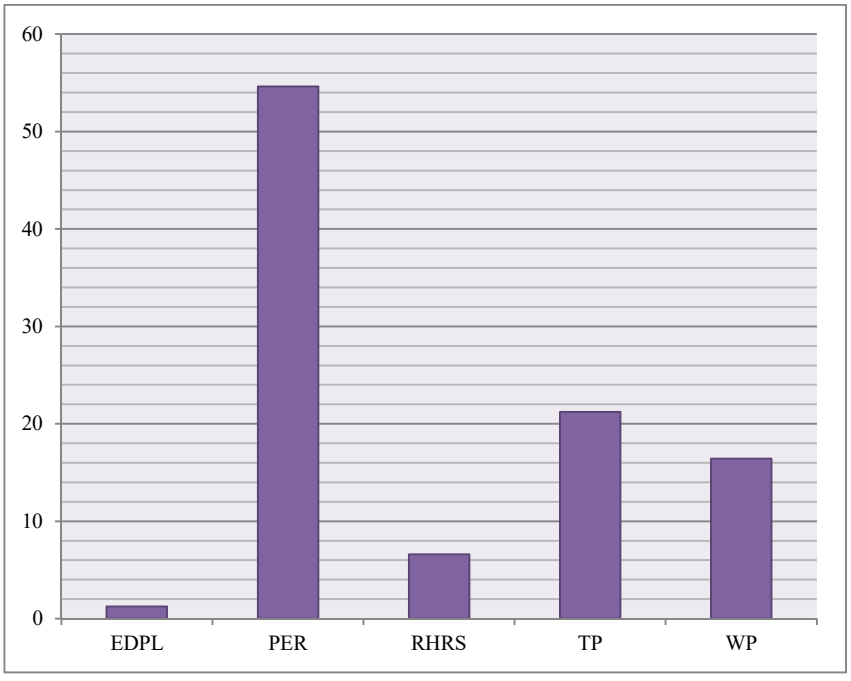
The three procedures of translation, as a whole, presented 713 examples, in the translation process.

Secondly, the number of times the three procedures were used per article is shown in Chart 3.20 and figure 3.16.:

CHART 3.20. TRANSLATION PROCEDURES PER ARTICLE

ARTICLE	Nº
EDPL: Environmental Diagnosis of the Poopo Lake	9
PER: Proposal of Environmental Remediation	389
RHRS: Retreatment of the Huanuni River Sediments	47
TP: Thesis Profiles	151
WP: Web Page	117
TOTAL	**713**

FIGURE 3.16. TRANSLATION PROCEDURES PER ARTICLE



In the article *Environmental Diagnosis of the Poopo Lake*, nine procedures were used; 389 procedures in *Proposal of Environmental*

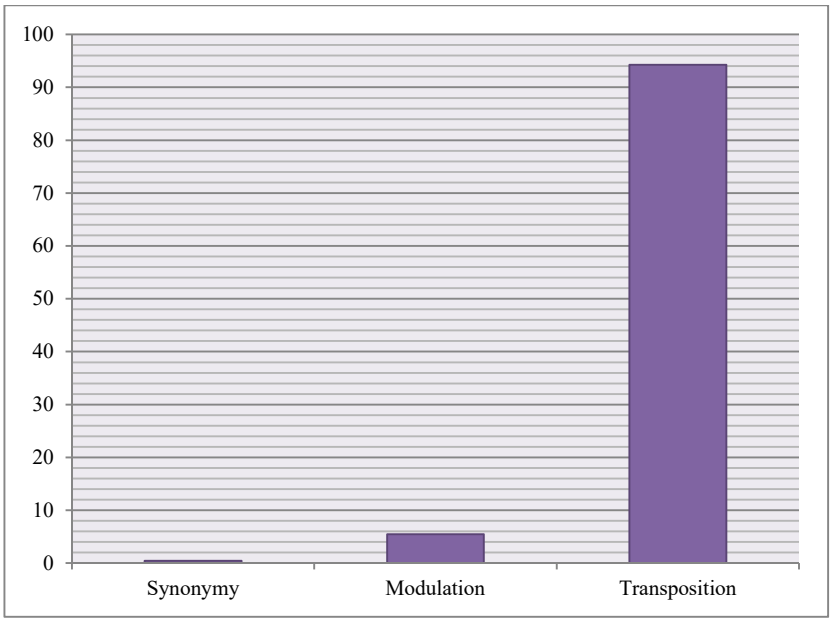
Remediation, 47 in *Retreatment of the Huanuni River Sediments*, 151 in *Thesis Profiles*, and 117 in *Web Page*. The article *Proposal of Environmental Remediation* has a **54.63%** of the total, the highest quantity of procedures.

Continuing with the analysis, the number of times each procedure was used in the Translation Process must be considered. This is presented in Chart 3.21 and Figure 3.17.

CHART 3.21. TRANSLATION PROCEDURES

PROCEDURE	Nº
Synonymy	3
Modulation	39
Transposition	671
TOTAL	**713**

FIGURE 3.17. TRANSLATION PROCEDURES



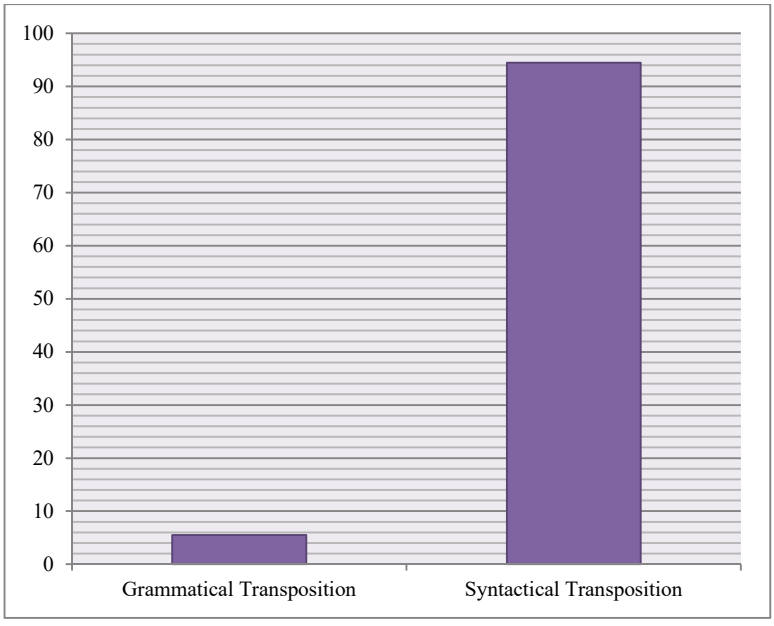
The Synonymy procedure was used 3 times in the translation of the 299 pages; the Modulation Procedure 39 times; and the Transposition Procedure 671 times. Summing up, Transposition was the most used procedure all along the translation process, having a **94.11%** of use.

Among the three procedures, Transposition is the most remarkable, not only for its usage, but also because it embraces several types of transposition, which are divided into two main groups, Grammatical and Syntactical Transposition. In Chart 3.22 and Figure 3.18 the number of Grammatical and Syntactical Transpositions is presented, the other types will be presented in detail afterwards.

CHART 3.22. TRANSPOSITION PROCEDURE

PROCEDURE	Nº
Grammatical Transposition	37
Syntactical Transposition	634
TOTAL	**671**

FIGURE 3.18. TRANSPOSITION PROCEDURE



The Syntactical Transposition presents an astonishing 94.49% of the Transposition procedure. It was used 634 times in the 299 pages of translation. The Grammatical one was used only 37 times, having the resting 5,51%.

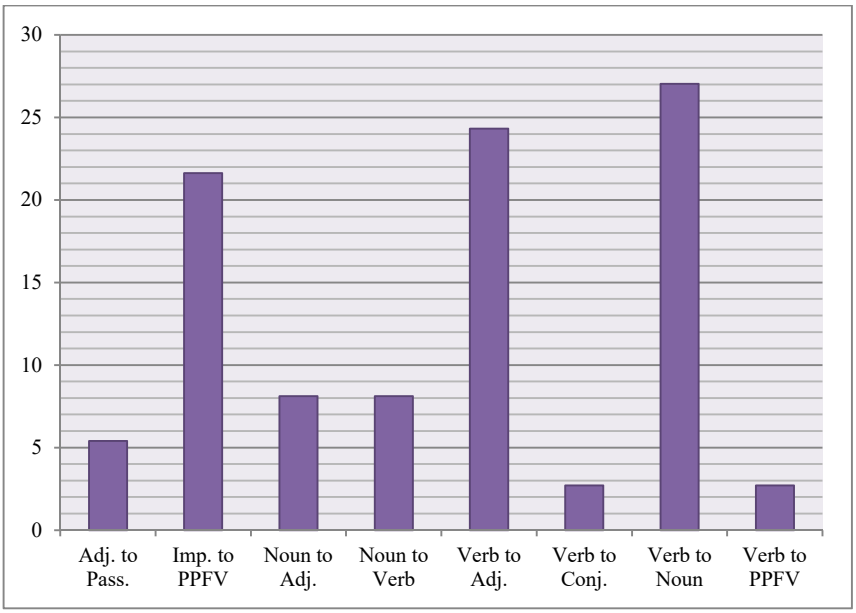
As mentioned before, each of the two Transposition Main Groups present different kinds of transposition inside of them. For example, Grammatical Transposition goes from one grammatical category to another: from **Noun** to **Verb**, or from **Noun** to **Adjective**; in the case of the Syntactical Transposition, it goes from an **Impersonal** sentence to the **Passive Voice**, or from the Spanish Syntactical structure **Verb – Noun** into the English Syntactical Structure **Noun – Verb**.

The smaller kinds of transposition found in the translation are mentioned in the following charts and figures, having Chart 3.23.1. and Figure 3.19.1. for the Grammatical Transposition and Chart 3.23.2. and Figure 3.19.2. for the Syntactical Transposition.

CHART 3.23.1. TYPES OF GRAMMATICAL TRANSPOSITION

PROCEDURE	Nº
From Adjective to Passive	2
From Impersonal to PPFV	8
From Noun to Adjective	3
From Noun to Verb	3
From Verb to Adjective	9
From Verb to Conjunction	1
From Verb to Noun	10
From Verb to PPFV	1
TOTAL	**37**

FIGURE 3.19.1. TYPES OF GRAMMATICAL TRANSPOSITION

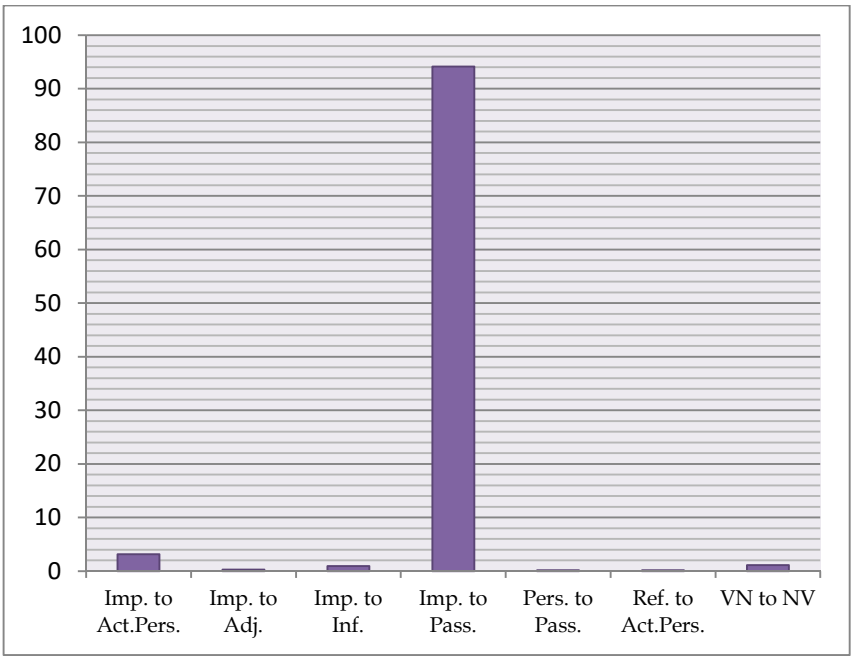


Inside the Grammatical Transposition, there are eight types of transposition. The most common is the **Verb** to **Noun** transposition, which has 10 cases, a 27 % of the total. The following two are the **Verb** to **Adjective** and the **Impersonal** to **PPFV** (Past Participial form of the Verb) with 9 and 8 cases each, respectively.

CHART 3.23.2. TYPES OF SYNTACTICAL TRANSPOSITION

PROCEDURE	Nº
From Impersonal to Active Personal	20
From Impersonal to Adjective	2
From Impersonal to Infinitive	6
From Impersonal to Passive Voice	597
From Personal to Passive Voice	1
From Reflexive to Active Personal	1
From VN to NV	7
TOTAL	**634**

FIGURE 3.19.2. TYPES OF SYNTACTICAL TRANSPOSITION



Seven types of Syntactical Transposition were found in the translation process. The Impersonal Sentence transposed to the Passive voice was used the most, with an average of 94.16% of the total. This is interesting because this kind of transposition is made because of the fact that the Spanish Impersonal sentences are usually translated into the English Passive Voice to grasp the essence of impersonality, because the impersonal sentences in English begin with an Expletive, and this structure does not sound natural in all the cases. The next type of transposition is made from the Spanish Impersonal sentence into a Personal Sentence in the Active Voice, with a 3.15% of the total transpositions.

Those are all the findings, regarding the Analysis of the procedures used in the translation process.

3.3. TERMINOLOGY

This task was the largest of the whole work; a lot of time was spent in it. The first step was the selection of technical terms, which was performed at the very beginning of the process, in the reading step. These terms were written in Chart 2.6 for a better organization. Four examples of the terminological terms are presented on this and next page.

CHART 3.24. TERMINOLOGICAL CARD EXAMPLE 1

FICHA TERMINOLÓGICA		
ENTRADA	**ETIMOLOGÍA**	**ESCUELA**
Abanico Aluvial	Portugués Abano / Latín. alluvĭes, aluvión	Geomorfología
DEFINICIÓN	Una acumulación de materiales aluviales, formados donde los cursos de agua con gradiente empinada contienen su velocidad abruptamente al fluir sobre un declive de ligera inclinación; formada generalmente como un abanico abierto o un segmento de un cono.	
FUENTE DE REFERENCIA		**EQUIVALENCIA**
http://www.ecoportal.net/content/view/full/70880		Alluvial Fans
COMENTARIOS		

CHART 3.25. TERMINOLOGICAL CARD EXAMPLE 2

FICHA TERMINOLÓGICA		
ENTRADA	**ETIMOLOGÍA**	**ESCUELA**
Aguas Negras	Latín aqua / niger, nigri	Hidrología
DEFINICIÓN	Fluidos procedentes de vertidos cloacales, de instalaciones de saneamiento; son líquidos con materia orgánica, fecal y orina, que circulan por el alcantarillado.	
FUENTE DE REFERENCIA		**EQUIVALENCIA**
http://www.construmatica.com/construpedia/Aguas_Negras		Sewage Water
COMENTARIOS	Sin. Aguas Residuales, Aguas Servidas o Aguas Cloacales.	

CHART 3.26. TERMINOLOGICAL CARD EXAMPLE 3

FICHA TERMINOLÓGICA		
ENTRADA	**ETIMOLOGÍA**	**ESCUELA**
Degradación de suelos	Latín gradus = paso, escalon / solum =suelo	Hidrología
DEFINICIÓN	Reducción o pérdida de la productividad, biológica o económica y la complejidad de las tierras agrícolas de secano, las tierras de cultivo de regadío, los pastizales, los bosques y las tierras arboladas, ocasionada en zonas áridas, semiáridas y subhúmedas secas, por los sistemas de utilización de la tierra o por un proceso o una combinación de procesos, incluidos los resultantes de actividades humanas y pautas de poblamiento.	
FUENTE DE REFERENCIA		**EQUIVALENCIA**
http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=degradacion		Soil Degradation
COMENTARIOS	Syn. Soil Deterioration, Soil spoilage	

CHART 3.27. TERMINOLOGICAL CARD EXAMPLE 4

FICHA TERMINOLÓGICA		
ENTRADA	**ETIMOLOGÍA**	**ESCUELA**
Venero	Latín Vena	Minería
DEFINICIÓN	Yacimiento de sustancias inorgánicas útiles.	
FUENTE DE REFERENCIA		**EQUIVALENCIA**
http://www.wordreference.com/definicion/venero		Lode
COMENTARIOS	Sin. yacimiento / Syn. Seam, Bed, Vein [**Venero** (hidr.) Manantial de agua]	

It is important to clarify that these cards were handmade at the beginning, but since there was a huge quantity of terms, it was decided to pass the information directly to Chart 2.5. (as shown in **Chart 3.28.1.** and **3.28.2.**) The terms selected in the Translation Process were 639, but in the process of looking for definitions and etymology, only the confirmed technical terms were left in the list, and the common words were deleted. Thus, the terminology presents a total of 576 terms, (**See Annex 4**).

CHART 3.28.1. COMPOUND TERMS

Nº	Spanish Entry	Gr. C.	Etymology		Area	Definition	Source	English Equivalent	Observations	
			Origin	Meaning					Prop	
1	Abanico Aluvial	n.	Portugués - Latín	port. Abano / lat. alluvĭes, aluvión	Ing.	Una acumulación de materiales aluviales, formados donde los cursos de agua con gradiente empinada contienen su velocidad abruptamente al fluir sobre un declive de ligera inclinación; formada generalmente como un abanico abierto o un segmento de un cono.	http://www.ecoportal.net/content/view/full/70880	Alluvial Fans		
2	Abertura de Descarga	n.	Latín - Latín	lat. Apertūra, /lat. carrus,	Ing.	Lugar por donde se descargan los minerales.	Own definition	Discharge Opening		
3	Abono orgánico	n.	Latín - Latín	lat. bonus, bueno / lat. Organĭcus	Agr.	Material cuya función principal es proporcionar elementos nutrientes a las plantas. Los abonos orgánicos son generalmente de origen animal o vegetal.	http://es.wikipedia.org/wiki/Abono	Organic Fertilizer		
4	Aceite Crudo	n.	Árabe y Latín	el árabe الزيت (az-zayt), lat. Crudus	Qmc.	El aceite que proviene de un yacimiento, después de separarle cualquier gas asociado y procesado en una refinería; a menudo se le conoce como crudo.	http://energia.glosario.net/terminos-petroleo/aceite-crudo-1812.html	Crude Oil		
5	Ácido Clorhídrico	n.	Latín y Griego	acidus /χλωρος, "amarillo verdoso	Qmc.	es una disolución acuosa del gas cloruro de hidrógeno (HCl).	http://es.wikipedia.org/wiki/%C3%81cido_clorh%C3%ADdrico	Hydrochloric Acid		
6	Ácido Graso	n.	Latín - Latín	acidus / crassus, "gordo" a través del latín vulgar grassa	Qmc.	Un ácido graso es una biomolécula orgánica de naturaleza lipídica formada por una larga cadena hidrocarbonada lineal, de número par de átomos de carbono, en cuyo extremo hay un grupo carboxilo.	http://es.wikipedia.org/wiki/Acidos_grasos	Fatty Acids		
7	Ácido sulfúrico	n.	Latín - Latín	acidus /latín sulphur)	Qmc.	es un compuesto químico muy corrosivo cuya fórmula es H2SO4	http://es.wikipedia.org/wiki/%C3%81cido_sulf%C3%BArico	Sulphuric Acid		
8	Acople Magnético	n.	Latín - Latín	copulāre, juntar / magnetum	Ing.	Fenómeno físico por el cual el paso de una corriente eléctrica variable en el tiempo por una bobina produce una diferencia de potencial entre los extremos de las demás bobinas del circuito. Cuando este fenómeno se produce de forma indeseada se denomina diafonía	http://es.wikipedia.org/wiki/Acoplamiento_magn%C3%A9tico	Magnetic Linkage		
9	Actividad Tectónica	n.	Latín - Latín	Activus	Geo.	(sismos, formación de montañas, actividad volcánica	es.wikipedia.org/wiki/Tectónica_de_placas	Tectonic Activity		
10	Activos Fijos	n.	Latín - Latín	Activus	Eco.	Los activos fijos son aquellos que no varían durante el ciclo de explotación de la empresa	http://es.wikipedia.org/wiki/Activo_fijo	Fixed Assets		
11	Agua Ácida	n.	Latín - Latín	Aqua Acidus	Qmc.	Agua que contiene una cantidad de sustancias ácidas que hacen al pH estar por debajo de 7,0	http://www.definicion.org/agua-acida	Acid Water	Sin.	Agua de Copajira

CHART 3.28.2. SIMPLE TERMS

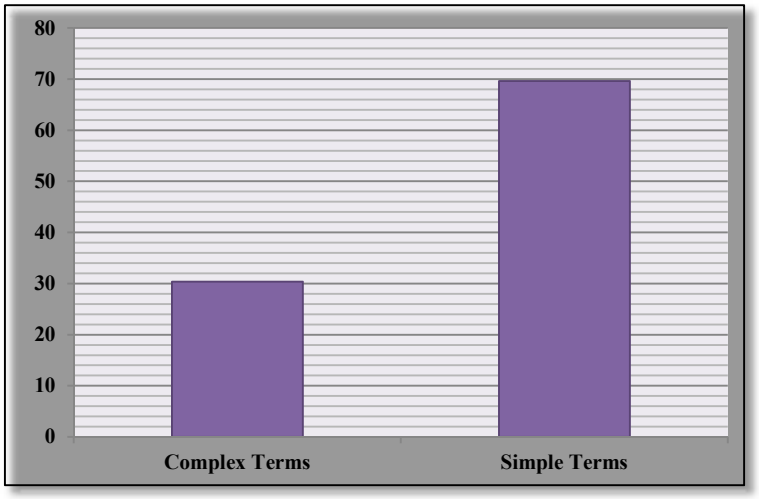
Nº	Spanish Entry	Gr. C.	Etymology		Area	Definition	Source	English Equivalent	Observations	
			Origin	Meaning					Prop	
1	Abiótico	adj.	Griego	sin vida	Zoo.	Caracterizado por la ausencia de vida. Sustancias abióticas son compuestos inorgánicos y orgánicos básicos, como agua, dióxido de carbono, oxígeno, calcio, nitrógeno, y sales de fósforo, aminoácidos y ácidos húmicos, entre otros. Lo mismo que azoico, esto es, período de la historia física de la tierra… sin organismos vivos	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,A/Itemid,99999999/catid,82/page,1/	Abiotic		
2	Acabado (piso)	n.	Latín	lat. caput, cabeza	Arq.	Perfeccionamiento final de una obra o labor:	http://www.wordreference.com/definicion/acabado	Finish of the dwelling floor		
3	Accesiones	n.	Latín	accessĭo, -ōnis	Der	Modo de adquirir el dominio, según el cual el propietario de una cosa hace suyo, no solamente lo que ella produce, sino también lo que se le une o incorpora por obra de la naturaleza o por mano del hombre, o por ambos medios a la vez, siguiendo lo accesorio a lo principal	www.rae.es	Accessions		
4	Accidentada	adj.	Latín	accidere (suceder); ad + cadere (caerse)	Geo.	terreno que es difícil de atravesar por sus desniveles	http://es.thefreedictionary.com/accidentado	Rugged	Syn.	Broken
5	Acidez	n.	Latín	Acidus	Qmc.	La acidez de una sustancia es el grado en el que es ácida. El concepto complementario es la basicidad.	http://es.wikipedia.org/wiki/Acidez	Acidity		
6	Acidificación	n.	Latín	Acidus	Qmc.	acción de acidificar	www.rae.es	Acidification		
7	Acondicionamiento	n.	Latín	latín condicio,	Arq.	Disposición de algo en las condiciones adecuadas	www.wordreference.com/.../acondicionamiento	Conditioning		
8	Acotado	adj.	Latín	Cautus Prudente	Topog.	Topográfico que muestra cotas o marcas de altitud	http://www.wordreference.com/definicion/acotado	Enclosed		
9	Actinomiceto	n.	Griego	de "actino-" y "-mices" o "-miceto"	Zoo.	Microorganismo productor de la actinomicosis.	http://www.acanomas.com/Diccionario-Espanol/50743/ACTINOMICETO.htm	Actinomicet		
10	Acuífero	n.	Latín	Aqua	Geo.	Zona terrestre con rocas permeables capaces de retener cantidades de agua que pueden ser explotables. Si su parte superficial está en contacto con la atmósfera, se denomina acuífero libre; si está cubierto por rocas impermeables y el agua retenida está a presión mayor que la atmosférica, se denomina acuífero confinado.	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,A/Itemid,99999999/catid,82/limit,50/limitstart,0/	Aquifer		
11	Aculturación	n.	Latín	latín cultūra, "cultivo",	Otr.	resultado de un proceso en el cual una persona o un grupo de ellas adquiere una nueva cultura (o aspectos de la misma), generalmente a expensas de la cultura propia y de forma involuntaria.	http://es.wikipedia.org/wiki/Aculturaci%C3%B3n	Acculturation		

The division of the terms into Simple and Complex was carried out following the procedures of the Terminological analysis. This division was already shown in the previous Charts 3.28.1 and 3.28.2.

CHART 3.29. TERMS

TYPE	Nº
Complex Terms	175
Simple Terms	401
TOTAL TERMS	**576**

FIGURE 3.20. TERMS



Afterwards, the terms were counted having the results shown in Chart 3.29 and Figure 3.20. The Simple Terms were 401, representing the 69,62 % of all the terms; and the Complex Terms were 175.

The acronyms had a special treatment because they could not be listed inside the previous charts, the features considered in Chart 2.5 were not appropriate for them. Therefore, they were listed in a

different one. In chart 3.30 is an example of the Acronyms found in the translation process.

CHART 3.30. ACRONYMS

Nº	Spanish Entry	Meaning	English Equivalent
1	ALBA	Auditoria Ambiental de Línea Base	Environmental Audits of Baseline
2	CANAPA	Campos Nativos de Pastoreo	Native Grazing Fields
3	CASOL	Cooperativa Agrícola de Solidaridad	Agricultural Cooperative of Solidarity
4	CEPLAG	Centro de Planificación y Gestión	Planning and Management Centre
5	CIBREF	Centro de Investigación en Biotecnología y Recursos Filogenéticos	Centre for biotechnology and Fitogenetic Resource Research
6	CIP	Centro Internacional de la Papa	International Potato Centre
7	CIPAM	Centro de Investigación y Producción de Animales Menores	Centre for Research and Production of Minor animals
8	CIPRODEC	Centro de Investigación, Promoción y Desarrollo de la Ciudad	Centre for Research, and Promotion and Development of the City
9	CISEP	Centro de Investigación y Servicio Popular	Centre for Research and Popular Service
10	CITES	Convención sobre el Comercio Internacional de Especies Amenazadas de Fauna y Flora Silvestres	Convention on International Trade in Endangered Species of Wild Fauna and Flora
11	DAR	Drenaje Ácido de Roca	ARD Acid Rock Drainage
12	DR.	Doctor	PhD.
13	FAO	La Organización de las Naciones Unidas para la Alimentación y la Agricultura	Food and Agriculture Organization
14	FCAPV	Facultad de Ciencias Agrícolas, Pecuarias y Veterinarias	School of Agricultural and Livestock, and Veterinary Sciences
15	FODA	Fortalezas, Oportunidades, Debilidades y Amenazas	SWOT, Strengths, Weaknesses, Opportunities, Threatens

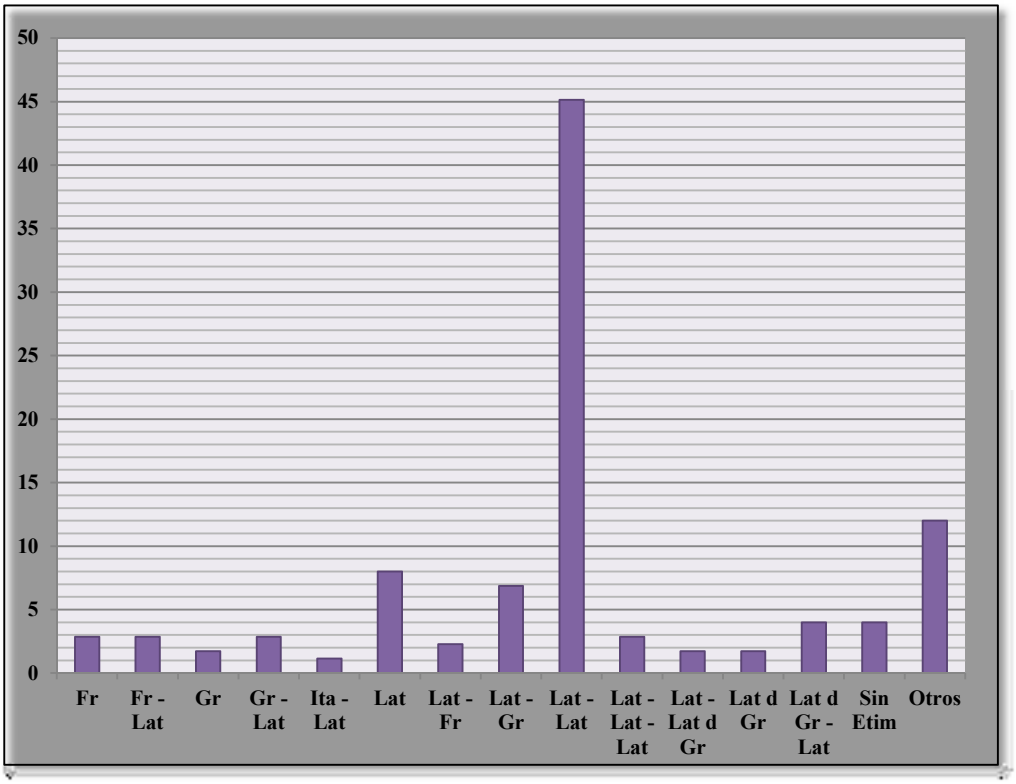
There were a total of 43 acronyms. They were listed taking into account what the acronyms represented, hence, the whole name was written in the **Meaning** column, and the **English Equivalents** in other column.

Besides the division of the complex and simple terms, the analysis of the terminology included an etymological study. In the following pages, the findings are shown.

CHART 3.31.1. ETYMOLOGY COMPLEX TERMS

LANGUAGE	Nº
Alemán	1
Árabe y Latín	1
Francés	5
Francés – Latín	5
Griego	3
Griego – Árabe	1
Griego – Catalán	1
Griego – Latín	5
Griego y Árabe	1
Inglés – Latín	1
Italiano – Latín	2
Latín	14
Latín – Francés	4
Latín - Francés - Latín del Griego	1
Latín – Griego	12
Latín – Italiano	1
Latín – Latín	79
Latín - Latín – Griego	1
Latín - Latín – Inglés	1
Latín - Latín – Italiano	1
Latín - Latín – Latín	5
Latín - Latín del Griego	3
Latín - Latín del Griego - Latín	1
Latín – Portugués	1
Latín del Celta - Latín	1
Latín del Griego	3
Latín del Griego - Epónimo – Epónimo	1
Latín del Griego – Griego	1
Latín del Griego – Latín	7
Latín del Griego - Latín - Latín del Griego	1
Latín del Griego - Latín del Griego	1
Neerlandés	1
Portugués – Latín	1
Provenzal y Griego	1
Sin Etimología	7
TOTAL	**175**

FIGURE 3.21. ETYMOLOGY COMPLEX TERMS



There were 175 terms in the Compound group. Several compound terms came from the Latin language. An 85.14% of the total compound terms had a Latin root in its structure, whether in one or all the words compounding the term. A 56% of terms, about 98 compound terms, had Latin as root of all the words compounding the term.

The analysis was made with the help of online dictionaries, such as the *RAE Online Dictionary*, as well as the *Online Etymology Dictionary*. An interesting point in the etymological study is the fact that when the etymology of some terms was looked for, they presented the expression "Latin del Griego". It meant that these terms came from Greek, but they were placed in the group "Lat d Gr" with a 10.86% of the total of terms.

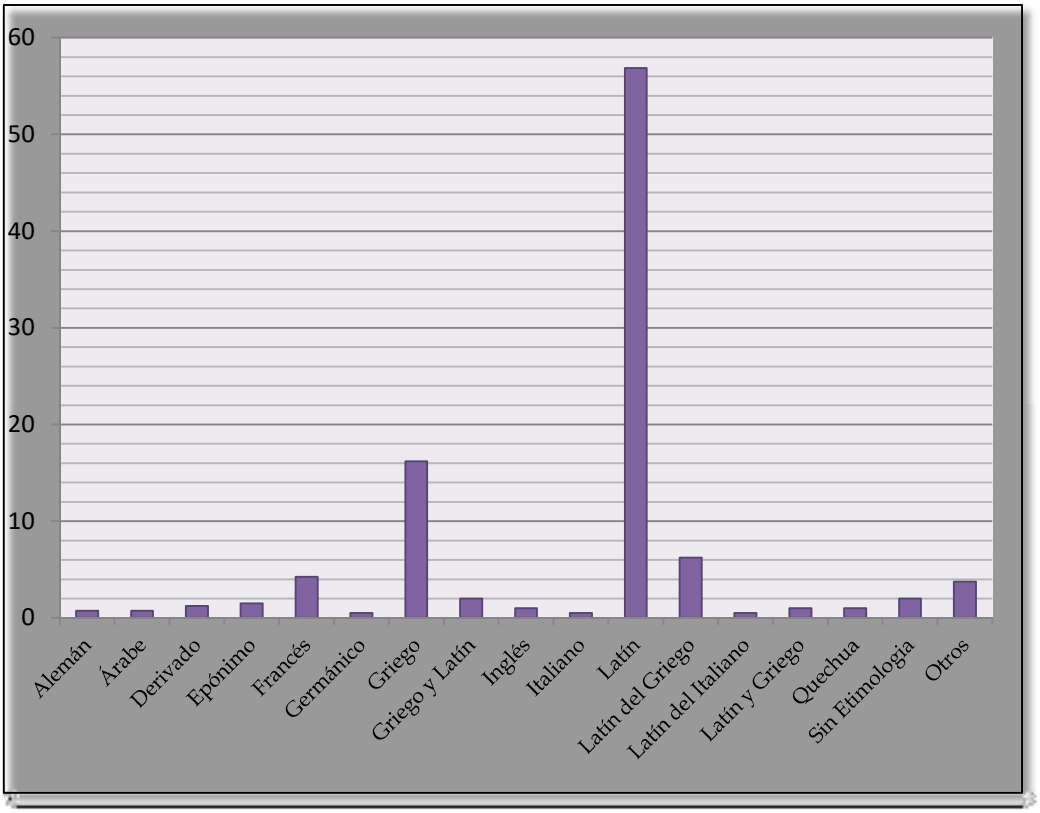
The etymologies that only appeared only one time were grouped in the column “Otros”, which represent a 10.86%.

CHART 3.31.2. ETYMOLOGY SIMPLE TERMS

LANGUAGE	Nº
Alemán	3
Árabe	3
Catalán	1
Celta	1
Chino	1
Derivado	5
Egipcio	1
Epónimo	6
Francés	17
Francés del Latín	1
Francés del Nórdico	1
Germánico	2
Gótico	1
Griego	65
Griego y Alemán	1
Griego y Latín	8
Hebreo	1
Inglés	4
Italiano	2
Italiano del Latín	1
Latín	228
Latín Árabe Griego	1
Latín del árabe	1
Latín del Griego	25
Latín del Italiano	2
Latín y Griego	4
Pre-romano	1
Quechua	4
Raíz Onomatopéyica	1
Sueco del Alemán	1
Sin Etimología	8
TOTAL	**401**

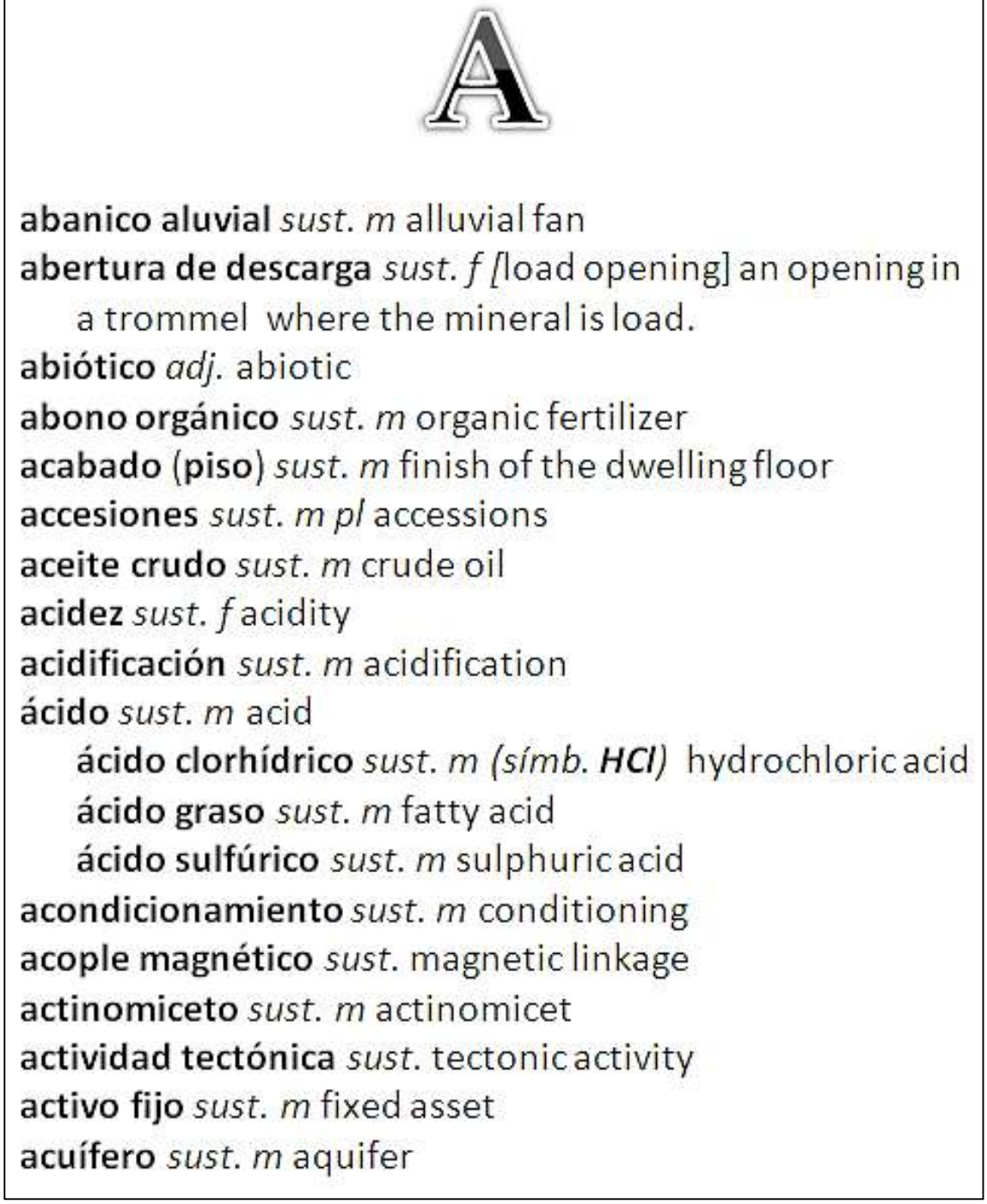
The simple terms were more than the complex terms. They are a 69.62% of all the terms. The higher quantity of terms had a Latin root, 56.86%, the second in list had a Greek root, 16.21%. The rest of the terms, 26.93%, had different roots, such as French, English, Italian. An interesting point is that there were 6 eponyms in the simple terms. An Eponym is a word or a name that is derived from the name of a person or a place. The following figure shows the results in Chart 3.31.2.

FIGURE 3.22. ETYMOLOGY SIMPLE TERMS



Having finished the terminological analysis, the terms were compiled in a Dictionary format in order to present it to the *Department of Postgraduate Studies and Scientific Research.* The following Figure represents an example of the compilation, presented in Annex 5.

FIGURE 3.23. EXAMPLE OF TERMINOLOGY COMPILATION



A

abanico aluvial *sust. m* alluvial fan
abertura de descarga *sust. f [*load opening] an opening in a trommel where the mineral is load.
abiótico *adj.* abiotic
abono orgánico *sust. m* organic fertilizer
acabado (piso) *sust. m* finish of the dwelling floor
accesiones *sust. m pl* accessions
aceite crudo *sust. m* crude oil
acidez *sust. f* acidity
acidificación *sust. m* acidification
ácido *sust. m* acid
ácido clorhídrico *sust. m (símb. **HCl**)* hydrochloric acid
ácido graso *sust. m* fatty acid
ácido sulfúrico *sust. m* sulphuric acid
acondicionamiento *sust. m* conditioning
acople magnético *sust.* magnetic linkage
actinomiceto *sust. m* actinomicet
actividad tectónica *sust.* tectonic activity
activo fijo *sust. m* fixed asset
acuífero *sust. m* aquifer

4. EXPERIENCES

Having worked in the *Department of Postgraduate Studies and Scientific Research* has given us the opportunity to acquire great experiences during the development of this *Supervised Work*. The knowledge acquired increased during the translation process and the development of the analysis of the translation and the compilation of the terminology. Besides the knowledge acquisition, we could put in practice the competences acquired during the five years of study at the Department of Linguistics and Languages, specifically the translation competences.

In the beginning of this *Supervised Work*, we had to read a lot, and this allowed us to know more about some environmental issues because the texts we were asked to translate were related to that area. These texts were reports or projects that were or are going to be carried out in the Department of Oruro; this allowed us to acquire more knowledge about the area, and about the Department.

As the translation process was being carried out, several obstacles had to be surpassed. We had to deal with the understanding of the terms, specifically with the meaning of the Spanish terms because some of them were not found in a monolingual terminological Spanish dictionary. The understanding would not have been achieved without the help of the people working at the *Department of Postgraduate Studies and Scientific Research.* They were very kind and patient when they had to explain a term or to help us see the meaning of a text, they also helped with the correction of the writing of some texts, because they were technical and we did not want to deviate the meaning from the original text. As they were specialists, they tried to explain the terms in common words, making the work easier at the moment of looking for the English equivalents.

Talking about the translation itself, we had problems in the translation of the texts that were inside the pictures. Most of the pictures were made in specialized and current computer programs we did not have access to or we did not know how to use them. So, we had to figure out how to translate them, because we would not have the help of a specialist since everybody was busy at the DPIC. Therefore, we had to manage using easy computer programs that were basic; but it took us more time to put together the texts and the pictures. It was an entertaining activity that had to be performed to complete totally the translation of the texts.

Another point that must be mentioned is the problems that we had with certain paragraphs or phrases that had complicate Spanish structures. These paragraphs or phrases were left aside for further study, we had to choose a proper procedure to translate them into English, sometimes we had to divide large Spanish sentences into smaller ones to keep the meaning, but in others we had to modulate the sentence because dividing it was not possible.

To summarize, this experience allowed us to put into practice and strengthen our translation knowledge, as well as other subject matters. The carried out activities, such as the analysis of the text, translation from the source language to the target language, correction and edition of the text, analysis of the techniques and terminology, and compilation of the terminology made us improve our translation competence.

CHAPTER IV

RESULTS

Having concluded the *Supervised Work*, the following results are presented:

1. TRANSLATION AS A PRODUCT

The General Objective of the *Supervised Work* was accomplished, having translated seventeen thesis profiles, one environmental report, two environmental proposals and the web page, all of them documents of the *Department of Postgraduate Studies and Scientific Research.*

The translation was carried out following the stages presented in the first Specific objective, which are: Correction and Edition of the source language documents (if needed), Translation of the first draft, Review and correction of the translation and Final edition of the translation.

Once the translation process was completed, a total of 299 (two hundred ninety nine) pages from twenty-one different documents, translated from Spanish into English were presented to the head of the *Department of Postgraduate Studies and Scientific Research.*

2. STUDY OF THE PROCEDURES

The objective of carrying out a study of the translation procedures used in the translation process was accomplished successfully. The procedures were counted and divided into their type of procedure. A chart and a graphic of the chart are presented in each of the divisions. The results are the following:

- Basically, the Literal procedure was used to translate the whole texts, but in the phrases, sentences or paragraphs in which the literal procedure was not enough to keep the meaning of the source text, we used other procedures: Modulation, Synonymy and Transposition. The number of these translation procedures was 713. The Synonymy procedure was used only three times; Modulation was used thirty-nine times, and Transposition was used a total of six hundred seventy one times in the process of translation of the 399 pages.

- The remarkable translation procedure is the Transposition, which was used 671 times. This procedure has two types of transposition, the grammatical and the syntactical, which were identified 37 and 634 times, respectively.

- Eight different types of Grammatical Transposition were used and, seven different types were used in the Syntactical Transposition.

3. TERMINOLOGICAL STUDY

The objective of carrying out a terminological study of the technical terms found in the translation process was also accomplished. The terms studied in the translation process were listed in a chart to carry out the analysis, the results are the following:

- In the first list, there were 639 selected words to be studied, but in the process, only the terms were kept in the list, and the common words were deleted. A total of 576 terms were left in the chart.

- Continuing with the terminological analysis, the simple terms had to be separated from the complex ones, as well as the acronyms, as the analysis required. A total of 401 simple terms were counted, and there were 175 complex terms. The acronyms had a special treat,

because they could not be listed in the term chart, therefore, they were listed in a different one. A total of 43 acronyms were found.

- The analysis of the terminology included an etymological study, in which it was found out that the higher quantity of terms came from Latin, with 415 terms, after Latin was Greek, with 74 terms. The rest 85 terms had different roots, such as French, English, Italian, Chinese, and so on. 4 terms came from Quechua, and also some Eponyms were found, 6 actually.

- The grammatical categories of the terms are the following: 59 adjectives, 2 adverbs, 505 nouns, and 10 verbs.

The most important result of this work is the *Terminology*, which is presented in the **Annex 4**.

4. WORK IN THE DEPARTMENT OF POSTGRADUATE STUDIES AND SCIENTIFIC RESEARCH

The *Department of Postgraduate Studies and Scientific Research* presented a report of the work carried out in the institution by us, the translator. In the report they provide a score the quality of the translation, punctuality, and responsibility. The scores can be seen in the final report of the *Supervised Work,* which is in the **Annex 1.**

CHAPTER V

CONCLUSIONS

1. CONCLUSIONS

Having finished the *Supervised Work*, which had as objective to translate different documents of the *Department of Postgraduate Studies and Scientific Research* (DPIC), a branch of the *Técnica de Oruro University,* the following conclusions are presented:

- ☑ More translating knowledge was learnt throughout the development of the *Supervised Work.* The steps to carry out the translations followed during the translation process helped us to improve our translating skills.

- ☑ All the proposed objectives were achieved.

    a) The translation was developed following the corresponding stages: Correction and Edition of the Source Text, Translation, Review of the Target Text, Correction and Final Edition of the target text.

    b) The pre-translation process was: analysis of the text, in which the function, style, register and tone were identified in order to choose the proper translation method and procedures for the text. The translation itself was carried out based on the procedure chosen in the pre-translation process. And finally, the post-translation

process was developed with the correction and edition of the translation.

c) A review of the translation procedures used in the translation process was carried out successfully. The procedures used in the translation process were Literal, Modulation, Synonymy and Transposition.

d) A terminological study of the technical terms found throughout the process of translation was also carried out. This task was done taking into account the mechanics of developing terminology corpus. First, identification of terms; second, listing of terms; loading terminology cards where the etymological origin was studied, an equivalent definition into Spanish was brought. This process was a really time-consuming task, we had some difficulties to find the proper equivalent for a lot of the terms, but it was important to find them for being essential to continue with the next objective.

e) A Spanish-English Terminology Corpus of the technical terms used in the documents was built up successfully; the format of presentation of this terminology is a guide book, presented in the **Annexes 5**.

Summarizing, the Supervised Work was finished, consolidating the linguistic knowledge we had acquired before the development of this work, besides that, some linguistic and extra-linguistic knowledge was also acquired in the translation of the documents.

2. RECOMMENDATIONS

After the development of this work, the experiences we went through made us notice some things that should be improved in the *Department of Linguistics and Languages* and in the *Department of Postgraduate Studies and Scientific Research*.

- ☑ In the *Department of Linguistics and Languages,* the subjects of Translation, *Translation Workshop I* and *II*, which are part of the curricula, should have more attention. Although the two *Translation Workshops* provided us knowledge and practice in the Translation area, this was not enough when we had to deal with translation in the *Supervised Work*. It must be considered that a *Translation Workshop III* should be included in the curricula for those who are interested in this area. Despite there is a few people that want to become translators, the authorities' aims should be to help them to become translators of remark in order to contribute to the society.

  Besides Translation, a subject supporting the translation area should be available all the time in the *Department of Linguistics and Languages*, for instance, a course or seminar of Correction and Edition of English texts, and a subject of Lexicology and Lexicography to build up Terminologies properly, should be considered because they could improve the skills of a translator and the quality of the translation. This is mentioned because in the different *Supervised Works* that were carried out, the terminology is presented in different ways and they should be standardized.

- ☑ Speaking about the *Department of Postgraduate Studies and Scientific Research,* we think that a subject of *Spanish writing* should be included as prerequisite to the postgraduate courses the department

provides. In the pre-translation process of Correction and Edition of the source texts, we had to deal with spelling mistakes, punctuation mistakes and even cohesive mistakes. Some of these mistakes gave the texts or paragraphs other meaning, exposing the text to be misunderstood. That is why we recommend a *Spanish Writing course* for the people who want to improve their academic status before they start any of the courses given in the Department.

- ☑ The need of a translator will continue in the department. Certainly, the institution will carry out other important studies in the future. Therefore, more Proposals or Reports will need to be translated. We recommend to keep the support they provide to the translators in order to have good results, we had not have any complaints of the treat or the materials they have provided us.

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ANNEXES

ANNEX 1

REPORT OF THE

"DPIC-UTO"

ANNEX 2

SOURCE AND TARGET TEXTS

1. GROUP 1

a) SPANISH TEXT

RETRATAMIENTO DE LOS SEDIMENTOS DEL RÍO HUANUNI COMO ALTERNATIVA DE REMEDIACIÓN AMBIENTAL DE LA CUENCA DEL RÍO SAN JUAN DE SORA SORA

1. ANTECEDENTES

La cuenca Sora Sora se encuentra localizada en la Provincia Pantaleón Dalence del departamento de Oruro, aproximadamente entre las coordenadas 66º45' de Longitud Este y 18º15' Latitud Sud; limita al Norte con el municipio de Oruro, al Sud con los municipios de Poopó y Antequera, al Este con el Departamento de Potosí y al Oeste con los municipios de El Choro y Machacamarca, ver figura 1.

Figura 1.- UBICACIÓN DE LA CUENCA, RíO SORA SORA

Esta cuenca está contaminada, principalmente por la actividad minera; el área afectada comprende 5,86 Km^2 aproximadamente a partir del punto de descarga de colas del Ingenio Santa Elena hasta el puente, cerca de la localidad de Machacamarca, en la carretera interdepartamental hacia Potosí. El río contaminado continúa bordeando el distrito de Machacamarca hacia el lago Poopó.

Realizar una remediación ambiental de toda esta zona es por demás difícil, especialmente por el aspecto económico que conlleva una actividad de esta envergadura. En efecto, será difícil lograr un financiamiento a fondo perdido para remediar toda la contaminación que actualmente se tiene en la zona, pero, si se recupera parte del contenido de un elemento valioso como es el estaño (como mineral de casiterita) que se encuentra en el lecho del río y acumulado por décadas de actividad minera, se puede allanar esta dificultad y dependiendo de la cotización de este importante elemento en el mercado internacional se puede, inclusive, no solo costear todo el proyecto de remediación sino que se podría subvencionar otros gastos que requiere toda esta compleja tarea.

2. JUSTIFICACIÓN

Regiones mineras como las que se encuentran en la cuenca de Sora Sora contienen cantidades apreciables de desmontes y colas o relaves, producto de actividades mineras. Por largos periodos, incluyendo décadas, las colas del ingenio Santa Elena no fueron depositadas en diques de colas, de acuerdo a exigencias de las normas medioambientales. Los efluentes provenientes del Ingenio Santa Elena fueron y son fuente de contaminación por la concentración elevada de iones pesados y la permanente generación de drenaje ácido por la presencia de minerales sulfurados.

Estos residuos minerales y sobre todo los que se encuentran en la ribera del río, expuestos al contacto con el aire, sufren un proceso de intensa oxidación

asociada con la disolución de metales pesados tóxicos, que, al entrar luego en contacto con el agua, producen la acidificación del agua y la migración contaminante de aguas superficiales y subterráneas.

Según relatos de los pobladores afectados, se han realizado intentos de proyectos de remediación que no han prosperado por la debilidad de los mismos y el financiamiento elevado para una posible solución. Hay criterios de varias personas, principalmente de los pobladores locales, de que los programas de remediación de estos sitios enfocados en la colección y tratamiento de las descargas ácidas en casi toda la extensión del río o en la reducción de infiltraciones y desvío de las aguas contaminadas deberían figurar entre las opciones propuestas. Sin embargo el tema de remediación ambiental es mucho más complejo a tal punto que en la legislación canadiense, por ejemplo, no se considera remediación ambiental la colección y tratamiento de aguas ácidas de mina sino tan solo como una solución temporal, siempre y cuando venga complementada con otras soluciones que eliminen la fuente de contaminación o la aíslen completamente.

Los procesos de concentración de minerales, no sólo en el Ingenio Santa Elena sino también en las pequeñas labores realizadas por cooperativistas y pequeños mineros a lo largo del río Huanuni, o en otras empresas de la propia Comibol con el ingenio de Machacamarca descargan sus residuos sólidos y líquidos en este río. Estas descargas, que hasta hace algunos años atrás, no eran controladas y no habían leyes que regulen las mismas, hoy en día continúan realizándose de la misma manera. Pero los hechos tienden a cambiar porque la situación se ha tornado dramática entre los pobladores de las distintas comunidades pues se ven afectados por este tipo de actividad no controlada adecuadamente por las autoridades llamadas a efectuar estos controles medioambientales y exigen una solución definitiva para eliminar, primero la contaminación, y segundo, remediar el área contaminada.

En la actualidad se está planificando la construcción de un Ingenio más grande en Huanuni, este tratará 3000 TPD. Felizmente, en este proyecto está incluida la construcción de un dique de colas, aspecto que de principio eliminará una de las fuentes principales de contaminación del río Huanuni, pero quedará toda el área contaminada a lo largo del río Huanuni hasta desembocar en el lago Poopó; por ello se deben buscar soluciones que permitan afrontar con objetividad esta remediación.

3. OBJETIVOS

Objetivo General

Contribuir a mejorar la calidad de vida de las comunidades afectadas a partir del aprovechamiento del estaño contenido en el venero del río de Huanuni para promover la remediación ambiental y generar excedentes para el desarrollo productivo de la sub-cuenca

Objetivos específicos

Por otro lado, para llegar a los resultados esperados será necesario:

- Caracterizar los sedimentos del lecho del río a partir de un muestreo en, por lo menos, tres sectores a lo largo del río, a partir del punto donde finaliza un antiguo dragado hasta el puente Machacamarca

- Estudiar el proceso de retratamiento a partir del desarrollo de pruebas experimentales en laboratorio para ver la factibilidad de recuperar el mineral de estaño que se encuentra en fina granulometría, empleando la concentración centrifuga y/o la concentración gravimétrica
- Dimensionar una planta de tratamiento industrial, en caso de ser favorable el anterior punto
- Efectuar un análisis económico en base a los resultados del anterior punto

4. ANÁLISIS DE LA PROBLEMÁTICA

El problema ambiental en toda la Cuenca de Sora Sora es extremadamente complicado y su remediación constituye un desafío que debe involucrar a propios y extraños para ser posible llevarla a cabo.

Para resumir el cuadro del deterioro de la calidad ambiental de la subcuenca se debe señalar lo siguiente:

- El área está afectada por una contaminación antropogénica emergente de actividades mineras y asentamientos humanos en poblaciones urbanas y campamentos desde hace casi un siglo atrás.
- Desde la promulgación de la Ley ambiental 1333 en 1992 y sus respectivos reglamentos no se han tomado medidas de mitigación ni se han ejecutado planes de remediación ambiental.
- Aún hoy en día se continúa descargando directamente a los ríos de la subcuenca y principalmente al río Huanuni los residuos sólidos mineros de los ingenios de Santa Elena, Machacamarca, Japo, Santa Fe y Morococala

b) ENGLISH TEXT

RETREATMENT OF THE HUANUNI RIVER SEDIMENTS AS AN ENVIRONMENTAL REMEDIATION OF THE SAN JUAN DE SORA SORA RIVER BASIN

1. BACKGROUND

The Sora Sora Basin is situated in the *Pantaleon Dalence* Province of the Department of Oruro, between 66°45' West Longitude and 18°15' South Latitude. It boarders at North on the Oruro Municipality, at South on the Poopo and Antequera Municipalities, at East on the Department of Potosi and at West on the El Choro and Machacamarca Municipalities. See figure 1.

Figure 1. THE BASIN LOCATION, SORA SORA RIVER

This basin is polluted, mainly by the mining activity. The affected zone has 5,86 Km^2 approximately, from the tailings discharges of the *Santa Elena* Smelter to the bridge, near the locality of *Machacamarca*, in the interdepartmental road to Potosi. The polluted river is still boarding the *Machacamarca* District towards the Poopo Lake.

To develop an environmental remediation of this entire zone is very difficult, especially for the economical aspect that entails this wide-ranging activity. Effectively, to obtain a non-recoverable fund to remediate the current pollution in the zone will be hard, but if part of the tin content (as cassiterite mineral), which is in the river bed and has been accumulated in decades of mining activities, would be recovered, it is possible to overcome this problem. Depending on the price of tin in the international markets, it is not only possible to finance the entire remediation project, but also to subsidize other expenses that this complex labour requires.

2. JUSTIFICATION

Mining regions, as those being in the Sora Sora basin, contain high quantities of mine wastes and tailings produced by the mining activities. For long periods, the *Santa Elena* Smelter tailings were not placed in dams as environmental standards require. The effluents coming from *Santa Elena* Smelter were and are a polluting source for the high concentration of heavy ions and the permanent generation of acid drainage because of the presence of sulphurated minerals.

This mineral wastes, overall those being in the riverbank, exposed to the air contact, suffer a process of intense oxidation associated to the dissolution of toxic heavy metals, that by coming in contact with water produce the acidification of water and the polluting migration of superficial and underground water.

According to the affected settlers, attempts of remediation projects have been developed, which have not worked out because of the weakness of these projects and of the high financing for a possible solution. There are some people's criteria, mainly of the local inhabitants, that the remediation programs in these sites focused on the collection and treatment of acid discharges all along the river extension or in the reduction of infiltrations and diversion of the polluted rivers should appear on the proposed options. Nevertheless, the environmental remediation subject is much more complex, to such a degree that in the Canadian legislation, for example, the collection and treatment of mining acid water are not considered environmental remediation but only a temporal solution, as long as it is complemented with other solutions that would eliminate or isolate completely the polluting source.

The processes of mineral concentration, not only in the *Santa Elena* Smelter, but also in the small works carried out by cooperativists and small miners all along the *Huanuni* River, or in other *COMIBOL* companies with the *Machacamarca* Smelter, discharge their solid and liquid wastes into this river. These discharges, that until some years ago were not controlled, nowadays are still done in the same way. But the facts tend to change because the situation has become dramatic among the inhabitants of the several communities. Since they find themselves affected by this activity non-properly controlled by the authorities called for perform these environmental controls, they demand a definite solution for, first, the pollution elimination, and second, the remediation of the polluted area.

Currently, the construction of a bigger smelter in Huanuni, that will treat 3000 TPD, is being planed. Happily, in this project, the construction of a tailings dam is included. This will eliminate one of the main polluting sources of the *Huanuni* River, but the

polluted area all along the *Huanuni* River will remain until the *Poopo* Lake; for that reason; solutions that allow facing this remediation with objectivity must be found.

3. AIMS

MAIN OBJECTIVE

To contribute to improve life quality in the affected communities starting from the exploitation of tin the *Huanuni* River spring to promote the environmental remediation and generate surplus for the productive development of the sub basin.

SPECIFIC OBJECTIVES

On the other hand, to achieve the expected results it will be necessary:

- To characterize the sediments of the river bed starting from a sampling in, at least, three sectors along the river, from the point of the finalization of the dredging to the *Machacamarca* Bridge
- To study the retreatment process from the experimental test development in the lab to know the feasibility of recovering tin, that is in a fine granulometry, applying centrifugal and/or gravimetric concentration
- To build a plant of industrial treatment, in case of being favourable to the previous point
- To carry out an economical analysis based on the previous point results

4. ANALYSIS OF THE PROBLEM

The environmental problem in all the *Sora Sora* Basin is highly complicated; its remediation is a challenge that must involve insiders and outsiders to achieve it.

To summarize the state deterioration of the environmental quality of the basin, the following must be mentioned:

- For a century, the area is affected by an anthropogenic pollution coming from mining activities and human settlements in urban towns and camps
- Since the promulgation of the Environmental Law 1333 in 1992 and their respective regulations, mitigation measurements have not been taken nor have environmental remediation plans been executed.
- Nowadays, the mining solids of the *Santa Elena, Machacamarca, Japo, Santa Fe* and *Morococala* Smelters, besides some other private smelters, are still discharged directly into the Sub-basin Rivers, mainly into the Huanuni River.

2. GROUP 2

a) SPANISH TEXT

FORMATO DE RESUMEN DEL TRABAJO DOCTORAL

Título

Propuesta de Plan de Ordenamiento Territorial y Medio Ambiental Minero - Caso Huanuni

Candidato: Fortunato Condori Huanca
Profesión: Arquitecto

Resumen

El centro poblado de Huanuni tiene un asentamiento centralizado en base a la actividad minera de explotación de un yacimiento de estaño mundialmente conocido; que, sin embargo, opera sin la componente ambiental, generando una fuerte contaminación ambiental por el vertido de sus desechos sin tratamiento alguno. Por otra parte, el crecimiento urbano, sin planificación del uso del territorio para la explotación y del desarrollo urbano, ha generado vulnerabilidad física y espacial urbana, afectando a la salud de los pobladores y trabajadores en la dinámica actividad de desarrollo de Huanuni.

El crecimiento urbano caótico y los asentamientos humanos susceptibles a los efectos negativos de la explotación minera en la localidad de Huanuni son objeto de estudio del presente trabajo de investigación doctoral; con el propósito de realizar en principio una evaluación ambiental, desde la perspectiva del Uso del Suelo y la Ocupación Territorial, que actualmente afectan a la vida urbana en dicha localidad; para luego, proponer un plan de ordenamiento territorial urbano y medio ambiental minero a partir de la incidencia de las operaciones mineras en los factores medioambientales.

Finalmente, la propuesta debe encarar también el proceso de cierre de la operación minera en el futuro; con el fin de disminuir los efectos significativos sobre los factores medioambientales, y de desarrollos sostenible urbanos posteriores.

Importancia

La Metodología para la Planificación del Ordenamiento Territorial y Medio Ambiental Minero permitirá generar un concepto sobre el desarrollo urbano sostenible; es decir que, considerando en la explotación minera, la dimensión física y espacial de los asentamientos urbanos que dicha explotación con lleva, estarán menos expuestos a factores de vulnerabilidad y riesgo.

Estado del conocimiento

En Bolivia desde 1996 se trabaja con el tema de Ordenamiento Territorial, donde se dan instructivas superiores mediante el entonces Vice Ministerio de Ordenamiento Territorial con Normativas y Metodologías dirigido a la producción agropecuaria. En estos documentos no existe incidencia en el tema minero que afecte o prevenga de asentamientos humanos en ciudades concentrados o dispersos. Lo más cercano que se toca con el nombre de macrozonificación ambiental, que está dirigida a la productividad agropecuaria.

De acuerdo a la Ley Nº 2140 de 25 de Octubre de 2000, Ley para la Reducción de Riesgos y Atención de Desastres, se plantea el considerar con carácter prioritario la temática de reducción de riesgos. Así la identificación y zonificación de las amenazas, vulnerabilidad y riesgos en el país, deben ser incorporadas en los Planes de Ordenamiento Territorial que se realizan en los distintos niveles de la administración del Estado.

En Síntesis, Los Planes de Uso del Suelo y Plan de Ocupación Territorial están dirigidos a efectos de adecuar las actuales actividades agropecuarias y forestales y no existen avances de Planes sobre minería específicamente.

Actualmente, las operaciones mineras que inician actividades, de acuerdo a la normativa ambiental boliviana, deben presentar un Estudio de Evaluación de Impacto Ambiental Analítico Integral, a partir de un primer procedimiento conocido como “categorización de impactos ambientales en función una matriz de identificación de impactos ambientales”.

En el estudio señalado, se parte de un Estudio de Línea Base Social y Ambiental; se evalúan los posibles impactos ambientales, se presenta el Plan de Manejo Ambiental; y finalmente, el plan de Cierre de la Operación; sin embargo, se hace muy poca o ninguna referencia a la Planificación Urbana de los asentamientos urbanos que conlleva la explotación minera.

Preguntas de Investigación Científica

- ¿Cuál el efecto del proceso y desarrollo de la actividad minera en Huanuni sobre los factores medioambientales y urbanos a partir de mapas de ordenamiento minero-ambiental?
- ¿Cuáles podrán ser las prerrogativas, derechos y posiciones entre la actividad minera y la actividad urbana?
- ¿Cuáles son las bases metodológicas que permiten la elaboración de un Plan de Ocupación Territorial Minero para delinear la organización Físico-Espacial de los asentamientos humanos de comunidades mineras?
- ¿En que grado se correlacionan los impactos ambientales en los factores ambientales y urbanos con la falta de ordenamiento territorial minero?

Objetivo General

Proponer un modelo de ordenamiento territorial urbano y medioambiental en operaciones mineras a partir de la planificación del uso del territorio para la explotación minera y el desarrollo sostenible urbano de comunidades mineras.

Objetivos Específicos

Realizar un diagnóstico del proceso y desarrollo de la actividad minera en Huanuni y su efecto en los factores medioambientales y urbanos a partir de un análisis físico-espacial y medioambiental

Estudiar las bases metodológicas que permiten la elaboración de un Plan de Ocupación Territorial Minera

Proponer un Plan de Ocupación Territorial Minera basado en el establecimiento de zonas de protección, acondicionamiento, cambio de ocupación, de exclusión e inclusión y otros, mediante sistemas de información geográfica urbana.

Plan Metodológico

a) Definición de las estrategias de acciones del tema.
b) Búsqueda de información a nivel mundial, latinoamericano (estudio de casos)
c) Definición del Concepto Ordenamiento Territorial Minero Ambiental vinculados a poblados concentrados con actividades mineras.
d) Prospección e inventario, cartográfico y otros del medio físico de la zona minera y de la ciudad de Huanuni.
e) Determinación del método de tratamiento de información
f) Diagnóstico territorial zonal, geológico-minero
g) Diagnostico de la situación de asentamientos de la población de Huanuni con impactos de la actividad Minera.
h) Estrategias y toma de decisiones participativa
i) Propuesta del Plan de Ordenamiento Territorial Minero
j) Propuesta del Plan Uso de Suelo Minero, ejemplo ciudad de Huanuni. (Zonificación territorial, Mapas de Ordenamiento Minero-ambiental y otros)
k) Plan de Ocupación Territorial de la actividad Minera (Mapas de Ordenamiento Minero-ambiental con el S.I.G.) con criterios de zonificación de corto, mediano y largo plazo :
    - Zonas de protección.
    - De acondicionamiento.
    - De cambio de ocupación.
    - De exclusión e inclusión.
    - Puesta de continua explotación.
    - Supuestos de contingencia.
    - Otros.
l) Simulación de prevención del Plan de Ocupación Territorial Minero (ejemplo afectación a cierre de la minería).
    - El nuevo rol de la ciudad
    - La nueva visión de la ciudad

- Inventario de la formación en conversión de sitos patrimoniales, atractivos turísticos de la minería.
- Integración a sistemas de líneas o rutas turísticas regionales y otros.

Resultados esperados

- Disponer de una metodología que sirva de base y guía para realizar el inicio de las operaciones mineras contemplando las prevenciones de los asentamientos urbanos de las comunidades mineras.
- Realizar la Base del Plan de Ordenamiento Territorial Minera, considerando a Huanuni como ejemplo en prevención de los impactos positivos negativos de contaminación y del desarrollo urbano
- El Documento podrá recomendar mediante el Ordenamiento Territorial Minero el uso de la infraestructura física de la producción minera de los destinos cuando se cierren las minas como también de las acciones que permitan prevenir los impactos negativos de la contaminación.

Tutores del Trabajo Doctoral:

Prof. Dr. Koppel (TU Berlín) -
Prof. Dr. Hoppenstedt (TU Berlín) –
Dr.- Ing. Gerardo Zamora E. (UTO)

Título

Propuesta de Desarrollo Agrícola Urbano en Oruro

Candidata: Carmen A. Elío Rodríguez
Profesión: Arquitecta

Resumen:

Oruro, dentro de los pisos ecológicos que tiene Bolivia, se ubica en el piso correspondiente al altiplano boliviano.

La Agricultura Urbana se ha convertido en una actividad de múltiples alcances culturales y económicos; según muchas investigaciones, viene siendo una importante fuente de alimento para las poblaciones urbanas, un medio para superar la pobreza de los países en desarrollo y una herramienta para la gestión ecológica de las ciudades.

En los procesos de desarrollo urbano en el altiplano boliviano, los movimientos migratorios han generado círculos de miseria en torno al centro urbano siendo estas las menos atendidas.

El proyecto de desarrollo agrícola urbano se circunscribe a las áreas periféricas urbanas de la ciudad de Oruro, en espacios donde se producen los asentamientos de migrantes que llegan a la ciudad en busca de mejores condiciones de vida, transfiriendo consigo la experiencia de la vida en el área rural (agricultura).

Importancia:

Mejorar la situación socio-económica y condiciones de alimentación de la población menos favorecida con el uso eficaz de los recursos con los que se cuenta (Suelo, agua, clima, aire), estableciendo un espacio dentro de la vivienda que brinde seguridad alimentaria a las familias

Estado de conocimiento:

Se conoce de experiencias realizadas en Bolivia, tanto en la ciudad de Cochabamba como en La Paz, con el objetivo de mejorar las técnicas de producción para la seguridad alimentaria y el uso racional de los recursos naturales y utilización de desechos orgánicos, mediante organización comunitaria, educación, y tecnología apropiada para la producción.

Con la implementación de invernaderos de adobe se ayudó a los campesinos de Achocalla a adaptarse a las nuevas condiciones, SEMTA ha construido invernaderos de adobe en su centro experimental y ha capacitado a 45 familias para que puedan cultivar sus pequeños huertos.

Gracias a sus invernaderos, las mujeres de CASOL han cuadruplicado la producción de vegetales que, por otra parte, crecen solamente en el Altiplano.

Lechugas, espinacas, tomates, pepinos y apio refuerzan actualmente la dieta familiar. Y, al regar sus plantas con agua potable extraída de un grifo comunitario, en vez de sacarla de ríos o cursos de agua contaminados, las familias están expuestas mucho menos a los riesgos que representan las enfermedades producidas por las aguas, en un área que vio el resurgimiento del cólera a principios de 1990.

Muchos países a nivel mundial han optado por la agricultura urbana como un medio para reducir la brecha de la pobreza y permitir a las familias la producción para el consumo.

Bolivia, en las últimas décadas, ha pasado de un medio rural a un medio urbano manteniendo su población con conocimientos y práctica en la producción agrícola, por lo que resulta fácil la implementación de estos principios.

Preguntas de Investigación Científica:

¿Cuales son las especies alimentarias que pueden adecuarse al desarrollo agrícola urbano en el altiplano boliviano a objeto de contribuir a la dieta alimentaria?

¿Cuáles son las áreas urbanas en la ciudad de Oruro que se adecuan para la implementación del desarrollo agrícola urbano?

¿Cómo aprovechar los factores de alta irradiación solar, abono orgánico, acuíferos subterráneos y agua de lluvia, nuevas tecnologías de riego y producción agrícola hidropónica vertical en el desarrollo agrícola urbano sostenible?

Objetivo General :

Contribuir a mejorar la seguridad alimentaria en asentamientos vulnerables a partir de una propuesta de desarrollo agrícola urbano sostenible en la ciudad de Oruro, aprovechando los factores ambientales del altiplano boliviano

Objetivos Específicos :

Realizar un diagnóstico físico-espacial y agrícola para determinar las especies alimentarías a ser consideradas para el desarrollo agrícola urbano sostenible

Estudiar los factores de alta irradiación solar, abono orgánico, acuíferos subterráneos y agua de lluvia, nuevas tecnologías de riego y producción agrícola hidropónica para desarrollo agrícola urbano sostenible

Proponer alternativas de desarrollo agrícola urbano sostenible para asentamientos de comunidades vulnerables

Plan Metodológico:

Análisis y evaluación de especies alimentarias aptas para su implementación en desarrollo agrícola urbano en el altiplano

Estudio de los factores ambientales: suelo, clima, aire y agua, para su mejor aprovechamiento en el desarrollo agrícola urbano

Elaboración de una propuesta de desarrollo agrícola urbano considerando:

- Normativas
- Establecimiento de áreas de intervención
- Aprovechamiento de los factores: Alta irradiación solar, abono orgánico, acuíferos subterráneos y agua de lluvia, nuevas tecnologías de riego y producción agrícola hidropónica vertical
- Multiplicación in Vitro de especies vegetales
- Planificación urbana de los asentamientos

Resultados esperados:

Determinación de especies vegetales con alto potencial nutritivo para su consumo y aptitudes para su desarrollo en el altiplano (carpa solar)

Establecer un área de intervención dentro de la ciudad con condiciones ambientales favorables para el desarrollo agrícola urbano sostenible

Presentación de una alternativa viable para mejora de las condiciones de vida de en asentamientos marginales vulnerables.

Tutores del Trabajo doctoral:

Prof. Dr. Giseke (TU Berlin)

Dr.-Ing. Gerardo Zamora E. (U.T.O.)

Dr. Arq. José Fornés.

b) ENGLISH TEXT

Title

Proposal of and mining land and environmental use and organization plan - the Huanuni Case

Candidate: Fortunato Condori Huanca
Profession: Architect

Summary

The populated centre of Huanuni has a settlement centralized on the mining activity of exploitation of a worldwide known tin bed, that, though, operates without the environmental component, generating a strong environmental contamination because of the dumb of its wastes without treatment. On the other hand, the urban growth, without planning of the use of the territory for the exploitation and urban development, has generated urban physical and spatial vulnerability, affecting the health of citizens and workers in the dynamic developmental activity of Huanuni.

The chaotic urban growth and the human settlements susceptible to the negative effects of the mining exploitation in the Huanuni Locality are the object of study of the present doctoral research; that has the purpose of carry out, first, a environmental evaluation from the focus of land use and occupancy; in order to propose a plan of urban and environmental land organization starting from the incidence of the mining operations in the environmental factors.

Finally, the proposal must also face the process of closure of the mining operation in the future, with the purpose of decrease the significant effects on the environmental factors, and the later urban sustainable developments.

Importance

The methodology to carry out the mining land and environmental use and organization will allow the generation of a concept of urban sustainable development, it means that, considering the mining exploitation, the physical and spatial dimension for the urban settlements that the mentioned exploitation carries with, will be less exposed to vulnerability and risk factors.

State of Knowledge

In Bolivia, the Land Use and Organization has been used since 1996, where superior instructions are given through the Vice Ministry of Land Use and Organization with regulations and methodologies directed to the agricultural and livestock production. In these documents there are no incidents in the mining matter that affect or prevent the human settlements in cities, disperse or crowded. The closest concept is known with the name of environmental macrozoning, which is aimed at the agricultural and livestock productivity.

According to the Law 2140 of October 25th, 2000, Law for the reduction of risks and attention of disasters, it is set out considering a priority the thematic of risk reduction. So, the identification and zoning of the threats, vulnerability and risks of the country must be incorporated in the Plans of Land Use and Organization that are developed in the different levels of the State Management. Summing up, the plans of land use and occupancy are directed in order to adequate the current agricultural and livestock and forest activities and there are no advance of mining plans, specifically.

Currently, the mining operations that start activities, according to the Bolivian environmental Regulations, must present an study of integral analytic evaluation of the environmental impact, starting from a procedure known as

"categorization of environmental impacts based on an environmental impact identification matrix."

In the mentioned study, it is started from a Social and Environmental Base Line Study; the possible environmental impacts are evaluated, the environmental management plan is presented; and finally, the plan of closure of operations; nonetheless, there is little or non reference to the urban planning of the urban settlements that entails mining exploitation.

Questions of Scientific Research

- Which is the effect of the process and development of the mining activity in Huanuni on the environmental and urban factors, from mining environmental organizing maps
- Which will be the prerogatives, rights and positions between the mining and urban activities?
- Which are the methodological bases that allow the elaboration of a mining land occupancy plan to deline the physical-spatial organization of the human settlements of mining communities?
- In what grade are the environmental impacts co-related in the environmental and urban factors with the lack of mining land organization?

Main Objective

To propose a model of urban and environmental urban land use and organization in mining operations starting from the planning of use of the land for mining exploitation and the urban sustainable development of mining communities

Specific Objective

To carry out a diagnosis of the process and development of the mining activity in Huanuni and its effect on the environmental and urban factors from a physical-spatial environmental analysis

To study the methodological basis that allow the elaboration of a mining land use and occupancy plan

To propose a Mining land Occupancy Plan based on the establishment of protection zones, conditioning, change of occupation, of inclusion and exclusion, and others, through systems of urban geographical information

Methodological Plan

m) Definition of the action strategies of the subject
n) Search of information worldwide, and Latin American level(Case Studies)
o) Definition of the concept of Mining-Environmental Land Use and Organization linked with crowded places with mining activities
p) Cartographical Prospecting and Inventory, and others, from the physical medium of the mining zone and the Huanuni
q) Territorial regional, geological-mining Diagnosis
r) Diagnosis of the situation of settlements in the Huanuni Town with impacts on the mining activity
s) Strategies and participative decision making
t) Proposal of a mining land occupancy plan
u) Proposal of a Mining Land Use and Organization Plan, for example in the Huanuni City, (Territorial Zoning, Maps of mining-environmental use and organization and others)
v) Plan of Land Occupancy of the mining activity (Maps of mining environmental organization with the G.I.S.) with short, middle and long term criteria:
    - Protection Zones

- Conditioning Zones
- Occupancy Zones
- Exclusion and inclusion Zones
- Zones Of Continuous Exploitation
- Budgets of contingency
- Others

w) Simulation of prevention of the Plan of Mining Land Occupancy (for example, affecting mining closure).

- The new role of the city
- The new vision of the city
- Inventory of the formation in conversion of patrimonial places, mining tourist attractions
- Integration to line systems or regional touristic routes and others

Expected Results

- To have at disposal a methodology that will be used as base and guide to carry out the beginning of the mining operations considering the preventions of the urban settlements of the mining communities
- To develop the base of the Mining Land Use and Organization Plan, considering Huanuni as an example of prevention of positive and negative contamination impacts and urban development
- The document will recommend through the Mining Land Use and Organization Plan the use of the physical infrastructure of the mining production of destinations when the mines close as well as the actions that allow preventing the negative contamination impacts when mines close

Tutors of the Doctoral Research:

Prof. Dr. Koppel (TU Berlin)
Prof. Dr. Hoppenstedt (TU Berlin)
Gerardo Zamora E. PhD. Eng. (UTO)

Title

Proposal of Urban Agricultural Development in Oruro

Candidate: Carmen A. Elio Rodriguez
Profession: Architect

Summary:

Oruro, among the Bolivia ecological strata, is located at the high plateau strata.
The Urban Agriculture has become an activity of multiple cultural and economic scopes; according to many investigations, it is being an important food source for the urban populations, a way to overcome the poverty of the developing countries and a tool for the ecological administration of the cities.
In the urban development processes in the Bolivian high plateau, the migratory movements have generated misery circles around the urban center, being these the less assisted.
The project of urban agricultural development is limited to the urban outlying areas of the Oruro city, in spaces where the establishments of migrants take place, who arrive to the city looking for better life conditions, transferring the life experience of the rural area (agriculture).

Importance:

It will improve the socioeconomic situation and feeding conditions of the less favoured population with the effective use of the available resources (soil, water, climate, air),

establishing a space inside the housing that offers alimentary security to the families

State of knowledge:

It has been heard from experiences carried out in Bolivia, in Cochabamba as in La Paz, which had the objective of improving the production techniques for the alimentary security and the rational use of the natural resources and organic wastes, through a community organization, education, and appropriate technology for the production.

With the implementation of adobe greenhouses, the Achocalla peasants were helped to adapt themselves to the new conditions. SEMTA (*Servicios Múltiples de Tecnologías Apropiadas*) has built adobe greenhouses in its experimental centre and it has qualified 45 families to cultivate their small orchards.

Thanks to their greenhouses, women of CASOL have quadrupled the production of vegetables that only grow in the High plateau. At the moment, lettuces, spinaches, tomatoes, cucumbers and celery reinforce the family diet. And, by watering their plants with drinkable water taken from a community faucet, instead of taking it out of rivers or contaminated courses of water, the families are much less exposed to the risks that represent the illnesses produced by water, in an area that saw the resurgence of the Cholera at the beginnings of 1990.

Worldwide, many countries have opted for the urban agriculture as a way to reduce the breach of poverty, allowing the families the production for their consumption.

Bolivia, in the last decades, has passed from a half rural medium to a half urban one, maintaining the population with knowledge and practice in the agricultural production, therefore the implementation of these principles is easy.

Questions of Scientific Research:

Which are the alimentary species that can be adapted to the urban agricultural development in the Bolivian high plateau in order to contribute to the alimentary diet?

Which are the urban areas in Oruro city that are appropriate for the implementation of the urban agricultural development?

How can we take advantage of the factors of high solar irradiation, organic fertilizer, underground aquifers and rain water, new irrigation technologies and vertical hydroponic agricultural production in the sustainable urban agricultural development?

Main Objective :

To contribute to improve the food security in vulnerable settlements starting from a proposal of sustainable urban agricultural development in the city of Oruro, taking advantage of the environmental factors of the Bolivian high plateau

Specific Objectives :

Proponer alternativas de desarrollo agrícola urbano sostenible para asentamientos de comunidades vulnerables

To carry out a physical-spatial and agricultural diagnosis to determine the alimentary species to be considered for the sustainable urban agricultural development

To study the factors of high solar irradiation, organic fertilizer, underground aquifers and rain water, new irrigation technologies and hydroponic agricultural production for sustainable urban agricultural development

To propose alternatives of sustainable urban agricultural development for settlements of vulnerable communities

Methodological Plan: Analysis and evaluation of alimentary species appropriate for their implementation in urban agricultural development in the high plateau Study of the environmental factors: soil, climate, air and water, for their best use in the urban agricultural development Elaboration of a proposal of urban agricultural development considering: - Regulations - Establishment of intervention areas - Use of the factors: high solar irradiation, organic fertilizers, underground aquifers and rain water, new irrigation technologies and vertical hydroponic agricultural production - Multiplication in Vitro of vegetable species - Urban planning of settlements
Expected Results: To determine the vegetable species with a high nutritive potential for its consumption and aptitudes for its development in the high plateau (solar tent) To establish an intervention area inside the city with favourable environmental conditions for the sustainable urban agricultural development To present a feasible alternative to improve the life conditions in the vulnerable marginal settlements
Tutors of the Doctoral Research: Prof. Dr. Giseke (TU Berlin) Gerardo Zamora E. PhD. Eng. (U.T.O.) Dr. Arq. José Fornés.

3. GROUP 3

a) SPANISH TEXT

PROPUESTA TÉCNICA, SOCIOECONÓMICA Y AMBIENTAL DEL TRATAMIENTO DE SEDIMENTOS DE RÍOS CONTAMINADOS COMO ALTERNATIVA DE REMEDIACIÓN AMBIENTAL Y DESARROLLO ECONÓMICO LOCAL

I. INTRODUCCIÓN

1.1 ANTECEDENTES

La concentración gravimétrica es la **más simple y económica** de todos los métodos de concentración de minerales; permite la recuperación de valores en un rango de tamaños bastante amplio y hoy en día está adquiriendo nueva importancia frente a otras opciones tecnológicas porque no tiene emanaciones ambientalmente contaminantes debidas al proceso o a insumos porque no requiere de reactivos ni de reacciones químicas de transformación que generen compuestos tóxicos.

La concentración gravimétrica centrífuga puede emplearse actualmente en un amplio rango de fracciones granulométricas que puede ir **desde 65 Mallas Tyler hasta 6 micrones**, utilizando equipos adecuados para diferentes rangos de tamaño de las fracciones, entre los que sobresalen: el concentrador Knelson, el Concentrador Falcon, el Separador Multi-Gravimetrico Mozley, la Centrifuga China y el Concentrador Kelsey-Jig

Varios estudios han sido realizados en los Laboratorios de Concentración de Minerales de la FNI; dentro de ellos se destacan los realizados mediante concentración centrífuga de muestras procedentes de 5 fuentes diferentes: 2 de ellas de yacimientos primarios (San Florencio y Japo); 2 son muestras de relaves antiguos (Kenko y San Miguel) y una es un producto fino de una operación actual (Underflow 120'de Huanuni), todas estas muestras con características y dificultades de procesamiento propias.

Las 5 muestras estudiadas han demostrado que pueden ser procesadas por concentración centrífuga y se pueden obtener excelentes resultados; superiores en todos los casos, a los resultados hasta ahora obtenidos por diferentes procesos y estudios.

La recuperación de casiterita por concentración gravimétrica centrífuga es eficiente para tamaños de partículas mayores a 10 micrones y por lo general se alcanzan recuperaciones muy altas (entre 70 y 90 %) en cada una de las fracciones granulométricas mayores a 10 micrones si las partículas tienen un grado de liberación adecuado, si se trata de partículas mixtas, estas pueden tener recuperaciones más bajas dependiendo del grado de asociación.

Los concentrados obtenidos para todos los casos pueden estar por encima del 40% y llegar hasta más del 60%.

Sin embargo, no se han reportado estudios referidos al "tratamiento de sedimentos de ríos" para recuperar la casiterita finamente diseminada; por lo que, este estudio se constituiría en un aporte importante al conocimiento y de aplicación práctica inmediata.

1.2 PROBLEMÁTICA

Por largos periodos, incluyendo décadas, las colas de los ingenios de Japo, Santa Fe y Morococala, no fueron adecuadamente depositadas en diques de colas, de acuerdo a exigencias de las normas medioambientales actualmente vigentes; sino que, sus descargas fueron a parar, en gran parte, a los cuerpos receptores acuosos.

La reactivación de los ingenios en el sector, por la subida de los precios de los metales, nuevamente comienza a realizar descargas sin la componente ambiental en sus operaciones. Esta fuente de contaminación será eliminada en la medida en que las autoridades ambientales hagan cumplir las normativas ambientales vigentes.

Sin embargo, los relaves presentes en los cauces de los ríos, con una alta presencia de sulfuros, están generando una fuerte carga de metales pesados disueltos, acidez y sulfatos, generados por la oxidación de dichos sulfuros (especialmente pirita y complejos sulfurados) presentes en los relaves descargados durante décadas, que alteran significativamente la calidad de las aguas de los ríos.

Por otra parte, la “inadecuada explotación” de los lechos de los ríos por parte de pequeños mineros, que recurren generalmente a una flotación rústica en buddle, utilizando para el propósito, ácido sulfúrico, xantatos y diesel en cantidades exageradas, agravan de sobremanera el impacto ambiental arriba descrito.

La filosofía de la propuesta puede pasar en pensar en una solución práctica para descontaminar el río; para ello, pueden considerarse diferentes alternativas, unas más caras que otras, y también unas más eficientes que otras; pero todas ellas, basadas en un “costo” para esta monumental tarea de remediación ambiental.

Así mismo, el concepto “win, win, win” hace pensar que el cause del río es “**un nuevo filón minero sin explotar**”. El avance tecnológico permite tratar “yacimientos” con contenidos de Sn tan pobres que antes fueron considerados como “colas”. Por tanto, el TRATAMIENTO DE LOS SEDIMENTOS MINERALIZADOS DEPOSITADOS EN EL RIO podría ser la alternativa técnicamente posible, puesto que la concentración centrífuga permite recuperar a la casiterita muy fina presente en los sedimentos; económicamente viable, puesto que permitiría generar utilidades; y finalmente, ambientalmente amigable, porque permitiría separar los sulfuros que alteran la calidad de los ríos de manera significativa. Así, sería posible “pagar la descontaminación” a partir de las utilidades generadas por una “explotación minera sostenible” del lecho del río.

El conocimiento a ser generado en la investigación permitiría dar una respuesta a “la remediación de varios cauces de ríos afectados por operaciones mineras antiguas”; lo que conduciría a mejorar la calidad de las aguas de los cauces de los ríos y por tanto, contribuir a restablecer y/o mejorar la producción agrícola de las zonas afectadas y por ende, incrementar la calidad de vida de las comunidades postergadas por los efectos de la contaminación.

En resumen, el presente trabajo de investigación enfoca su objeto de estudio al tratamiento de los sedimentos de los cauces de los ríos mediante concentración gravimétrica centrífuga para recuperar el Sn fino diseminado; y al mismo tiempo, con las utilidades del proceso, generar el recurso económico necesario para la remediación ambiental, basada en la separación y disposición final de los sulfuros diseminados y el adecuado manejo ambiental de los sólidos del proceso; además de, encarar el desarrollo económico local de las comunidades afectadas.

La formulación precisa de las preguntas de investigación es la siguiente:

Con carácter descriptivo:

¿Cuál es el efecto de impacto ambiental que causan los residuos mineros (colas) presentes en los ríos de Japo, Santa Fé y Morococala?

¿Es posible recuperar el Sn fino del cauce bajo de la confluencia de los ríos Japo, Santa Fé y Morococala?

Con caracter correlacional:

¿Qué créditos económico, sociales y ambientales causa el tratamiento de los causes de los ríos como alternativa de remediación ambiental?

Con carácter Explicativo:

¿Es posible encarar la remediación ambiental y el desarrollo económico local de las comunidades afectadas?

1.2.1 Solución de una Problemática Ambiental

La presencia de sulfuros (piritas y complejos sulfurados) en los cauces de los ríos, al entrar en contacto con el agua y en presencia del oxígeno del aire, se oxidan, generando drenajes ácidos que alteran el pH y cargan de metales pesados las aguas de la cuenca. Por tanto, se hace necesario la "remediación ambiental" a objeto de que las aguas puedan ser utilizadas para fines especialmente agrícolas por las comunidades aledañas.

La remediación podría tener "costos incalculables"; sin embargo, si se "considera los cauces de los ríos contaminados como reservas minerales", la explotación sostenible de los mismos podría permitir al mismo tiempo la "remediación ambiental" y la generación de los "recursos económicos" para realizar el "desarrollo económico local" de las comunidades que han sido afectadas.

1.2.2 Viabilidad Técnica, Socioeconómica Y Ambiental De La Propuesta

El contenido de Sn en los cauces de los ríos es muy pobre (posiblemente cerca al 0.15 % o más); sin embargo, la coyuntura del precio de este metal en el mercado internacional es "muy alto", por lo que, si se considera un proceso barato y de tecnología simple, es posible pensar en recuperarlo. Asimismo, en el proceso de tratamiento, se separan también los sulfuros, cuya fracción puede ser dispuesta de manera ambiental, y así "eliminar" la fuente principal de contaminación.

El estudio económico de la propuesta involucra el cálculo de ingresos a partir de la venta de los concentrados y la ley de Sn a ser obtenida en las pruebas metalúrgicas y la determinación de los costos de inversión; costos directos e indirectos; análisis de flujo y sensibilidad y otros.

Finalmente, las "utilidades" del proceso podrían permitir "desarrollar económicamente" las comunidades afectadas en base al mejoramiento de sus vocaciones productivas. La propuesta de desarrollar la remediación y a través de ésta, generar utilidades económicas entra en el concepto "win, win win".

1.2.3 Aplicación Práctica

La propuesta estará sustentada en base científica obtenida a partir de pruebas metalúrgicas de laboratorio. Se trata de una investigación científica con enfoque cuantitativo; con alcance experimental.

1.2.4 Relevancia Social

La propuesta tiene un "carácter participativo"; puesto que se desea involucrar a las comunidades afectadas, dotándoles de un "medio" para generar su propio desarrollo económico local.

1.2.5 Sustentabilidad De Las Propuestas

La propuesta tiene un “carácter participativo”; puesto que se desea involucrar a las comunidades afectadas, dotándoles de un “medio” para generar su propio desarrollo económico local.

1.3 OBJETIVOS

1.3.1 Objetivo General

Contribuir a mejorar la calidad de vida de las comunidades de la subcuenca Japo - Morococala y Santa Fe a partir del estudio técnico, económico y ambiental de los sedimentos del río como alternativa objetiva y práctica de remediación ambiental y fuente financiera para encarar el desarrollo económico local

1.3.2 Objetivos Específicos

- Realizar un diagnóstico socioeconómico y ambiental de la subcuenca
- Caracterizar los sedimentos del lecho del río mediante pruebas geoquímicas estáticas y dinámicas.
- Estudiar la factibilidad técnica, socioeconómica y ambiental de la recuperación del mineral de estaño que se encuentra en fina granulometría en los sedimentos del río, empleando la concentración centrifuga y/o la concentración gravimétrica
- Proponer alternativas de desarrollo económico local de las comunidades a partir de un Plan de negocios que involucre las componentes técnica, económica, social y ambiental

II. METODOLOGÍA

2.1 METODOLOGÍA GENERAL

2.1.1 Fase I (Trabajo de Gabinete)

- Recopilación y análisis de información a partir de fuentes secundarias referidas a: Diagnóstico socioeconómico y ambiental de la subcuenca
- Adquisición de Imágenes Satelitales, Mapas de: Geología, Geomorfología, Suelos e Hidrología, Uso de la tierra, Cobertura vegetal de la zona y otros
- Análisis, Evaluación y Sistematización de la Información existente
- Planificación del trabajo de campo con el equipo técnico
- Preparación del Mapas Temáticos mediante imágenes satelitales
- Elaboración de Mapa Base y definición de Unidades de Paisaje
- Preparación de materiales y equipos para muestreo y caracterización de los sedimentos del río

2.1.2 Fase II (Trabajo de Campo)

- Reuniones con Autoridades locales para presentación del trabajo a realizar, presentar los alcances y el plan de trabajo
- Reconocimiento del área de estudio y contrastación del mapa base con las unidades existentes en el terreno

- Evaluación de Mapas Temáticos preliminares
- Muestreo sistemático de los Sedimentos del Río
- Talleres con Actores en Poblaciones y Comunidades
- Realización de encuestas y entrevistas con organizaciones locales y pobladores

2.1.3 Fase III (Trabajo Experimental en Laboratorio)

- Pruebas geoquímicas ambientales y de concentración gravimétrica centrífuga en laboratorio
- Evaluación e Interpretación de resultados
- Elaboración de una Propuesta de Remediación Ambiental de la Cuenca
- Elaboración de una Propuesta de Desarrollo Económico Local

2.1.4 Fase IV (Validación y Difusión de Resultados)

- Presentación del Diagnóstico Socioeconómico a los Actores
- Selección y Priorización de las actividades productivas de interés comunitario
- Definición de Acciones
- Formulación de la Propuesta Técnica, Económica y Ambiental de Remediación y de desarrollo económico local

2.2 METODOLOGÍA ESPECÍFICA

La Metodología Específica desarrollada se desglosa a continuación:

2.2.1 Diagnóstico Socio-económico y ambiental de la subcuenca

a) Diagnóstico Socio-económico

Enfoque Cuantitativo:

- Elaboración de las encuestas para obtener información sobre aspectos Sociales, Económicos y sobre la Percepción de los Comunarios referidos a los Factores Ambientales
- Realización de la evaluación del instrumento de medición
- Determinación de las muestras estadísticas a partir de la información del INE (considerando un error del 5% y 95 de confiabilidad)
- Preparación de las brigadas de encuestadores
- Realización de la campaña de encuestas
- Análisis y Evaluación de los resultados de la encuesta
- Presentación de los resultados socioeconómico y ambientales

Enfoque Cualitativo:

- Inmersión de campo
- Elaboración de entrevistas semi-estructuradas sobre los aspectos Sociales, Económicos y sobre la Percepción de los Comunarios referidos a los Factores Ambientales

- Preparación de las brigadas de personal que realizará las entrevistas
- Realización de la campaña de entrevistas
- Análisis y Evaluación los resultados de las entrevistas
- Presentación de los resultados socioeconómicos y ambientales

b) Diagnóstico Ambiental

Para realizar una evaluación de los factores ambientales, se consideró:

Clima, se usaron los datos de la estación situada en el área de estudio (área de influencia), proporcionada por SENAMHI, los datos obtenidos son de 60 años (1945 - 2005). Para los datos meteorológicos faltantes se utilizó el "Método Racional Deductivo". Este método permite estimar los registros mensuales faltantes, apoyándose en la información que brindan los años completos (Campos, 1987).

Flora, los aspectos descriptivos de las asociaciones vegetales, se estudio en el marco de la sociología de plantas, la metodología utilizada son dos, el transecto variable (propuesto por Foster et. al 1995) y cuadrantes (método propuesto por Braun Blanquet, 1979). También se evaluó las estrategias y formas de vida (métodos propuestos por Grime, 1979 y Raunkiaer, 1937, respectivamente).

Fauna, para analizar el estado de protección de la fauna silvestre en la zona de estudio se baso en tres categorías:

1) Especies protegidas por la legislación boliviana. Se toman en cuenta aquellas que figuran en decretos supremos vigentes y que establecen la prohibición total de su caza y/o comercio, sin establecer límites de tiempo.

2) Especies de comercio internacional restringido. Son especies bolivianas que figuran en los Apéndices I y II del Convenio sobre Comercio Internacional de Especies Amenazadas de Fauna y Flora Silvestre (CITES).

3) Especies amenazadas de extinción. Están comprendidas las especies bolivianas que figuran en el diagnóstico mundial auspiciado por la Unión Internacional para la Conservación de la Naturaleza (UICN) de las especies que presentan diferentes grados de amenazas. Este diagnóstico ha sido publicado como el "Libro Rojo".

Suelo, en el caso de este factor ambiental se desarrolló el estudio de riesgo de erosión y degradación de suelos utilizándose para el efecto técnicas especiales de SIG y Teledetección. Esto se constituye en una etapa de importancia en planificación de acciones destinadas a la protección y aprovechamiento de los recursos naturales, así como para la ejecución de planes de manejo y conservación de suelos. La primera etapa del proceso de evaluación de riesgo contempla la elaboración de mapas

temáticos de: geología, geomorfología, cobertura vegetal, unidades erosivas y el mapa de pendientes.

El mapa de unidades geológicas se obtuvo de las cartas geológicas disponibles por el Servicio Geológico de Bolivia. Para el caso del área de estudio se han utilizado las hojas geológicas 6239 a escala 1:100000.

Los mapas de unidades geomorfológicos, cobertura vegetal y unidades erosivas se han obtenido a partir de técnicas especiales de Teledetección. Para tal efecto, se utilizaron imágenes satélite LANDZAT TM. El análisis visual se realizó utilizando tres bandas de sensor, coincidiendo con la capacidad de los monitores empleados en informática, siendo estos monitores RBG (Red - Blue - Green).

El mapa de pendientes se elaboró a partir de las curvas de nivel procedentes de la cartografía del Instituto Geográfico Militar (escala 1:50000), con curvas de nivel acotadas cada 20 metros.

Análisis de riesgos biofísicos

Cada uno de los mapas generados se evaluó y reclasificó según un riesgo de erosión y degradación de suelos, luego fueron sobrepuestos y analizados a través de matrices bidimensionales utilizando técnicas especiales de SIG. El mapa de riesgo de erosión y degradación de suelos, además de reflejar el estado actual del deterioro, permite hacer un análisis de intervención a mayor profundidad, a partir del cual es posible identificar en el área de estudio zonas con múltiples grados de degradación y erosión de suelo. Con esta información se posibilita la generación de áreas de priorización e intervención a nivel de subcuencas. Este análisis se realiza mediante una ponderación de los grados de riegos el cual se inicia desde la reclasificación de las de los mapas temáticos. En una subcuenca los grados de riesgo que se identifican son: Áreas de riesgo muy bajo, Áreas de riesgo bajo, Áreas de riesgo moderado, Áreas de riesgo alto, Áreas de riesgo muy alto

En la Figura 2.1, se detalla la metodología para el análisis del riesgo de erosión y degradación de suelos utilizándose para el efecto técnicas especiales de SIG y Teledetección.

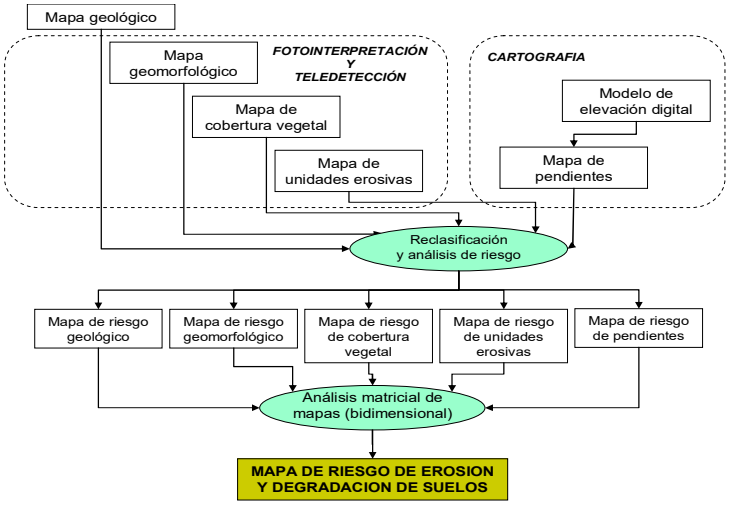

Figura 2.1 Flujograma para el análisis de riesgo de erosión y degradación de suelos

Agua, se tomaron muestras de aguas superficiales de los ríos de la cuenca alta: Japo, Morococala, Santa Fe; además de , PAirumani y Aco-Aco en la cuenca baja, para determinar su grado de contaminación; en especial, por metales pesados.

2.2.2 Tratamiento Metalúrgico De Los Sedimentos Del Río Como Alternativa De Remediación Ambiental

- Realización de la campaña de muestreo
- Caracterización física, química y mineralógica de los sedimentos
- Realización de las pruebas geoquímicas estáticas y dinámicas para evaluar el impacto ambiental debido al aporte de acidez y carga de metales pesados de los sulfuros presentes en los sedimentos
- Realización de las pruebas de flotación y concentración centrífuga para la separación de los sulfuros y recuperar el Sn de los sedimentos, respectivamente
- Análisis y evaluación de la disposición final de los residuos, producto del tratamiento
- Diseño del flujograma de tratamiento de los sedimentos del río
- Presentación de la Propuesta Técnica del Tratamiento de los Sedimentos del Río como alternativa de remediación ambiental

En la figura 2.2 se ha esquematizado los puntos de muestreo, en el sector menos accidentado de este río que arrastra colas con contenidos de sulfuros desde los distritos de Morococala, Santa Fe y Japo.

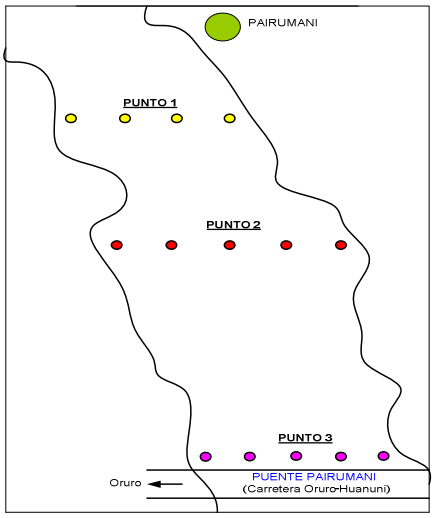

Figura 2.2 Esquema de los puntos de muestreo en el río Payrumani-Japo

FUENTE: Elaboración propia

La experimentación metalúrgica en sí, con todas las muestras obtenidas en los puntos 1, 2 y 3, se llevó a cabo de acuerdo a:

- Secado de las muestras
- Homogeneización, cuarteo y obtención de muestras representativas, para las diferentes pruebas
- Clasificación en diferentes tamaños de grano
- Flotación de sulfuros
- Concentración centrifuga en Falcon
- Concentración en mesas vibrantes
- Separación magnética

2.2.3 Estudio Técnico, Económico Y Ambiental

Dentro de las alternativas que pueden darse para la remediación ambiental y/o mitigación del impacto ambiental en la región, se consideró el RETRATAMIENTO DE LOS SEDIMENTOS MINERALIZADOS DEPOSITADOS EN EL RIO.

- Diseño del flujograma
- Dimensionamiento de equipos
- Cálculos de costos directos e indirectos (indicadores económicos)
- Evaluación de Impactos Ambientales

2.2.4 Propuesta de Desarrollo Económico Local

- Realización del análisis de los Factores Externos (Oportunidades y Amenazas) y Factores Internos (Fortalezas y Debilidades).
- Determinación de las Potencialidades, Riesgos, Desafíos y Limitaciones de las comunidades de Pairumani y Aco-Aco.

- Análisis y evaluación de alternativas de desarrollo productivo, mediante la propuesta de programas, subprogramas y/o proyectos.

La metodología a utilizarse para la elaboración de la Propuesta de Desarrollo Económico Local se basó en tres componentes:

1] Alternativa de Conservación, Recuperación y Protección de la Fauna y Flora,

2] Análisis del Aprovechamiento Sostenible de los Recursos Naturales y

3] Análisis Socioeconómico-Ambiental del área de influencia directa,

b) ENGLISH TEXT

TECHNICAL, SOCIOECONOMIC AND ENVIRONMENTAL PROPOSAL FOR POLLUTED RIVER SEDIMENT TREATMENT AS AN ALTERNATIVE OF ENVIRONMENTAL REMEDIATION AND LOCAL ECONOMIC DEVELOPMENT

I. INTRODUCTION

1.1 BACKGROUND

The gravimetric concentration is the simplest and cheapest of all the methods of mining concentration; it allows the recovering of values in a wide size range, and nowadays is acquiring new importance against other technological options because it does not have emanations environmentally contaminating due to the process or supplies, because it does not require reagents nor chemical reactions of transformation that generate toxic compounds.

The gravimetric-centrifugal concentration can be applied in a wide range of granulometric fractions that can vary from 65 Tyler Mesh to 6 microns, using appropriate equipment for different ranges of fraction size, among them, the Knelson Concentrator, Falcon Concentrator, the Mozgrade Multi Gravimetric Separator, the Chinese Centrifuge and the Kelsey-Jig Concentrator .

Several studies have been carried out in the Laboratories of Mining Concentration of the National School of Engineering (FNI); among them they stand out those carried out by means of centrifugal concentration of samples coming from 5 different sources: 2 of them of primary deposits (San Florencio and Japo); 2 are samples of old tailings (Kenko and San Miguel) and one is a fine product of a current operation (Underflow 120' from Huanuni), all these samples with characteristic and own prosecution difficulties.

The five studied simples have shown that can be processed by centrifugal concentration and excellent results can be obtained, superiors to all the results obtained by different processes and studies so far.

The cassiterite recovery by centrifugal gravimetric concentration is enough for the sizes of particles higher to 10 microns and, generally, higher recoveries are achieved

(from 70 to 90%) in each of the granulometric fractions higher than 10 microns if the particles have a proper release degree, it there are the mixed particles, these can have a lower recovery depending on the grade of association.

The concentrates obtained for the cases can be over the 40% and reach more than the 60%.

Nonetheless, studies referred to the "treatment of river sediments" for recovering the cassiterite finely spread have not been reported, therefore; this study will constitute a contribution to knowledge and immediate practical application.

1.2 PROBLEM

For long periods, even decades, the tailings of the Japo, Santa Fe and Morococala Smelters have not been properly deposit in tailing dams, according to requirements of the environmental regulations in force, but their discharges ended, most of them to the water receptive bodies.

The reactivation of the smelters in the sector, because of the rise of the metal prices, starts to carry out discharges without considering the environmental component in their operations. This source of pollution will be eliminated as the environmental authorities make enforce the environmental regulations in force.

However, the present tailings in the river beds, with a high presence of sulphides, are generating a strong load of dissolved heavy metals, acidity and sulphates, generated by the oxidation of this sulphides (especially pyrite and sulphide complexes) present in the tailings discharged during decades, which alter significantly the quality of the water of the rivers.

On the other hand, the "inadequate exploitation" of the river beds by small-miners that that appeal generally to a rustic flotation in buddle, using for the purpose, sulphuric acid, xantates and diesel in exaggerated quantities, increases up extremely the environmental impact described above.

The philosophy of the proposal must be thought of a practical solution for decontaminate the river; for that purpose, different alternatives can be considered, some more expensive than others, and also some more efficient that others; but all of them based on a "cost" for this monumental task of environmental remediation.

Likewise, the "win, win, win" concept makes us think that the river bed is "a new mining vein without exploitation". The technological progress allows treating "deposits" with contents of Sn so poor that before they were considered as "tailings". Therefore, the TREATMENT OF THE MININGIZED SILTS DEPOSITED IN THE RIVER could be the technically possible alternative, since the centrifugal concentration allows to recover to the very fine cassiterite present in the sediments; economically viable, since it would allow to generate utilities; and finally, environmentally friendly, because it would allow to separate the sulphides that alter the quality of the rivers in a significant way. This way, it would be possible "to pay the decontamination" starting from the utilities generated by a "sustainable mining exploitation" of the channel of the river.

The knowledge to be generated in the investigation would allow to give an answer to "the remediation of several river beds affected by old mining operations"; what would lead to improve the quality of the water of the river beds and, therefore, to contribute to reestablishment and/or improvement of the agricultural production of the affected areas and to increase the life quality of the communities put over because of the contamination effects.

In summary, the present investigation work focuses its object of study to the treatment of the sediments of the river beds by centrifugal gravimetric concentration to recover the disseminated fine Sn; and at the same time, with the utilities of the process, to generate the necessary economic resource for the environmental remediation, based on the separation and final disposition of the disseminated sulphides and the appropriate environmental management of the solids of the process; besides, to face the local economic development of the affected communities.

The precise formulation of the investigation questions is the following:

Descriptive Character:

Which is the effect of the environmental impact that cause the mining residuals (tailings) present in the rivers of Japo, Santa Fe and Morococala?

Is it possible to recover the fine Sn of the low river bed of the confluence of the Japo, Santa Fe and Morococala Rivers?

Correlational Character:

What economic, social and environmental interests cause the treatment of beds of the rivers as an alternative of environmental remediation?

Explanatory Character:

Is it possible to face the environmental remediation and the local economic development of the affected communities?

1.2.1 Solution of an Environmental Problem

The sulphides presence (pyrites and sulphide complexes) in the beds of the rivers, when contacting with the water and in presence of the oxygen of air, they are oxidised, generating acid drainages that alter the pH and load the basin with heavy metals. Therefore, the "environmental remediation" becomes necessary in order that water can be used for especially agricultural purposes by the surrounding communities.

The remediation could have "incalculable costs"; however, if it is considered that the beds of the polluted rivers as mining deposits", the sustainable exploitation of them could allow them at the same time "environmental remediation" and the generation of those "economic resources" to carry out the "I develop economic local" of the communities that have been affected.

1.2.2 Technical, Socioeconomic and Environmental Viability of the Proposal

The content of Sn in the river beds is very poor (possibly close to 0.15% or more); however, the joint of the price of this metal in the international market is "very high". Hence, if a cheap process with simple technology is considered, it is possible to think of recovering it. Besides, in the treatment process, the sulphides are also separated, whose fraction can be disposed environmentally, and so "eliminate" the main contamination source.

The economic study of the proposal involves the calculation of incomes starting from the sale of the concentrate and the Sn grade to be obtained in the metallurgic tests and the determination of the investment costs; direct and indirect costs; analysis of flow and sensibility and others.

Finally, those "utilities" of the process could allow "to develop economically" the affected communities based on the improvement of their productive activities. The proposal of developing the remediation and through this, to generate economic utilities, enters in the "win, win, win" concept.

1.2.3 Practical application

The proposal will be founded in scientific basis obtained starting from metallurgic laboratory tests. It is a scientific investigation with quantitative focus, with experimental scope.

1.2.4 Social relevance

The proposal has a "participative character;" since it aims at involving the affected communities, providing them of a "medium" to generate its own local economic development

1.2.5 Sustainability of the Proposals

The proposal has a "participative character ", since it aims at involving the affected communities, providing them of a "medium" to generate its own local economic development.

1.3 AIMS

1.3.1 Main Objective

To contribute to the improvement of the life quality of the communities of the Japo - Morococala and Santa Fe sub-basin starting from the technical, economic and environmental study of the river sediments as a objective alternative and practice of environmental remediation and financial source to face the local economic development

1.3.2 Specific Objectives

- To carry out a socioeconomic and environmental diagnosis of the sub-basin
- To characterize the sediments of the river bed by geochemical static and dynamic tests
- To study the technical, socioeconomic and environmental feasibility of the recovery of the tin mining that is in fine granulometry in the river sediments, using the centrifugal and/or gravimetric concentration
- To propose local economic development alternatives of the communities from a Business Plan that involves the technical, economic, social and environmental components

II. METHODOLOGY

2.1 GENERAL METHODOLOGY

2.1.1 Phase I (Desk work)

- Collection and analysis of information starting from secondary sources referred to: Diagnostic socioeconomic and environmental of the sub-basin
- Acquisition of Satellite Images, Maps of: Geology, Geomorphology, Soils and Hydrology, Land Use, vegetation Coverage of the area and others
- Analysis, Evaluation and Systematizing of the existent Information
- Planning of the field work with the technical team
- Preparation of the Thematic Maps by satellite images
- Elaboration of a Base Map and definition of Landscape Units
- Preparation of materials and teams for sampling and characterization of the river sediments

2.1.2 Phase II (Field Work)

- Meetings with local Authorities for the presentation of the work to carry out, to present the scope and the work plan
- Recognition of the area of study and comparison of the base map with the existent units on the land
- Evaluation of preliminary Thematic Maps
- Systematic sampling of the River Sediments
- Workshops with Actors in Populations and Communities
- Development of surveys and interviews to local organizations and residents

2.1.3 Phase III (I Work Experimental in Laboratory)

- Environmental geochemical and gravimetric centrifugal concentration in laboratory Tests
- Evaluation and Interpretation of results
- Elaboration of a Proposal of Environmental Remediation of the Basin
- Elaboration of a Proposal of Local Economic Development

2.1.4 Phase IV (Validation and Diffusion of Results)

- Presentation of the Socioeconomic Diagnosis to the Actors
- Selection and Priorization of the productive activities of communitarian interest
- Definition of Actions
- Formulation of the Technical, Economic and Environmental Remediation Proposal and of local economic development

2.2 SPECIFIC METHODOLOGY

The developed Specific Methodology is explained below:

2.2.1 Socio-economic and environmental diagnosis of the Sub-basin

a) Socioeconomic Diagnosis

Quantitative Approach:

- Elaboration of the surveys to obtain information about Social, Economic aspects and about the Perception of the Community people referred to the Environmental Factors
- Determination of the statistic samples from the information of the INE (considering a error of 5% and 95 of reliability)
- Administration of the evaluation of the instrument of measurement
- Determination of the statistical samples starting from the information of the INE (considering an error of 5% and 95 of dependability)
- Training of the survey brigades
- Development of the survey campaign
- Analysis and Evaluation of the survey results
- Presentation of the socioeconomic and environmental results

Qualitative Approach:

- Analysis and Evaluation of the interview results
- Field immersion

- Elaboration of interviews semi-structured on the Social, Economic aspects and about the Perception of the Community people referred to the Environmental Factors
- Training of personnel's brigades that will carry out the interviews
- Realization of the interviews campaign
- Analysis and Evaluation of the interview results
- Presentation of the socioeconomic and environmental results

b) Environmental Diagnosis

To carry out an assessment of the environmental factors, the following was considered:

Weather, the data of the station located in the study area (influence area), provided by SENAMHI, were used; the obtained data is from 60 years ago (1945 - 2005). For the missing meteorological data, the "Deductive Rational Method" was used. This method allows calculating monthly the missing registrations, based on in the information that provide the complete years (Campos, 1987).

Flora, the descriptive aspects of the vegetable associations were studied, taking into account the sociology of plants; the used methodologies are two, the variable transect (proposed by Foster et. at the 1995) and quadrants (method proposed by Braun Blanquet, 1979). The strategies and forms of life were also evaluated (methods proposed by Grime, 1979 and Raunkiaer, 1937, respectively.)

Fauna, the analysis of the protection state of the wild fauna in the study area was based on three categories:

1) Species protected by the Bolivian legislation. Those figuring in effective Supreme Decrees are taken into account. These decrees establish the total prohibition of hunting and/or trade, without establishing limits of time.
2) Species of restricted international trade. They are Bolivian species that figure in the Appendixes I and II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).
3) Threatened species. They are the Bolivian species that figure in the world diagnosis promoted by the International Union for Conservation of Nature and Natural Resources (IUCN) of the species that present different grades of threats. This diagnosis has been published as the "Red List."

Soil, in the case of this environmental factor, the study of erosion risk and Soil degradation was developed using for this purpose special techniques of GIS and Teledetection. This has become an important stage in planning actions aimed at protecting and using the natural resources, as well as at executing plans of management and conservation of floors. The first stage of the process of evaluation of risk embraces the elaboration of thematic maps of: geology,

geomorphology, vegetation coverage, erosive units and the map of slopes.

The map of geologic units was obtained from the available geologic maps by the Bolivian Geologic Service. For the study area, the geologic sheets 6239 to scale 1:100000 have been used.

The maps of geomorphologic units, vegetation coverage and erosive units have been obtained starting from special Teledetection techniques. For that purpose, satellite images LANDZAT TM were used. The visual analysis was carried out using three sensor bands, coinciding with the capacity of the monitors used in computer sciences, being these monitors RBG (Net - Blue – Green.)

The slope map was elaborated starting from the contour lines coming from the cartography of the Geographical Military Institute (scale 1:50000), with contour lines enclosed each 20 meters.

Analysis of biophysical Risks

Each one of the generated maps were evaluated and reclassified according to erosion risk and soil degradation, then they were superimposed and analyzed through two-dimensional matrixes using special techniques of SIG. The map of erosion risk and soil degradation, besides reflecting the current state of the deterioration, allows making an intervention analysis to more depth, from which it is possible to identify in the area of study regions with multiple degradation grades and floor erosion. With this information, the generation of Priorization areas and intervention at sub-basins level is made possible. This analysis is carried out by a weighing of the grades of watering which begin from the reclassification of those of the thematic maps. In a sub-basin the grades of risk that are identified are: Areas of very low risk, Areas of low risk, Areas of moderate risk, Areas of high risk, Areas of very high risk

In the Figure 2.1, the methodology is detailed for the analysis of the erosion risk and degradation of soils using special techniques of SIG and Teledetection.

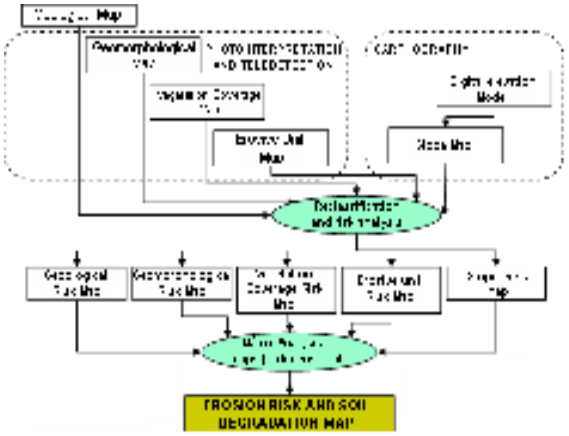

Figure 2.1 Flowchart for the analysis of erosion risk and degradation of soils

Water, samples of superficial water were taken of the rivers of the high basin: Japo, Morococala, Santa Faith,; besides, Pairumani and Aco Aco in the low basin, were taken to determine their grade of contamination; especially, by heavy metals.

2.2.2 Metallurgic Treatment of the Sediments of the River as an Alternative of Environmental Remediation

- Development of the sampling campaign
- Physical, chemical and mineralogical characterization of the sediments
- Development of the static and dynamic geochemical tests to evaluate the environmental impact due to the acidity contribution and load of heavy metals of the sulphides present in the sediments
- Development of the flotation and centrifugal concentration tests for the separation of the sulphides and the recovering the Sn of the sediments, respectively
- Analysis and evaluation of the final disposition of the residuals, product of the treatment
- Design of the flowchart of the river sediments treatment
- Presentation of the Technical Proposal of the River Sediments Treatment as an alternative of environmental remediation

In the figure 2.2, the sampling points have been schematized, in the less rugged sector of this river that drags tailings with sulphide contents from the districts of Morococala, Santa Faith and Japo.

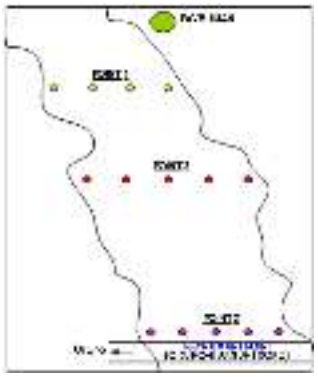

Figure 2.2 Outline of the sampling points in the river Pairumani-Japo

SOURCE: Own elaboration

The metallurgic experimentation, with all the samples obtained in the points 1, 2 and 3, was carried out according to:

- Drying of the samples
- Homogenization, quartering and obtaining of representative samples for the different tests
- Classification in different grain sizes
- Sulphide flotation
- Centrifugal concentration in Falcon
- Concentration in vibrating tables
- Magnetic separation

2.2.3 Technical, Economic and Environmental Study

Among the alternatives that can be given for the environmental remediation and/or mitigation of the environmental impact in the region, the RETREATMENT OF THE MININGIZED SEDIMENTS DEPOSITED IN THE RIVER was considered.

- Design of the flowchart
- Sizing of the equipment
- Calculations of direct and indirect costs (economic indicators)
- Evaluation of Environmental Impacts

2.2.4 Proposal of Local Economic Development

- Development of the analysis of the External Factors (Opportunities and Threats) and Internal Factors (Strengths and Weaknesses)
- Determination of the Potentialities, Risks, Challenges and Limitations of the communities of Pairumani and Aco Aco
- Analysis and evaluation of alternative of productive development, by the proposal of programs, subprograms and/or projects

The methodology to be used for the elaboration of the Proposal of Local Economic Development was based on three components:

1) Alternative of Conservation, Recovery and Protection of the Fauna and Flora,
2) Analysis of the Sustainable Use of the Natural Resources and
3) Socioeconomic-environmental analysis of the area of direct influence

ANNEX 3

TRANSLATION PROCEDURES

PROCEDURES USED IN THE TRANSLATION PROCESS

EDPL: Environmental Diagnosis of the Poopo Lake
RHRS: Retreatment of the Huanuni River Sediments
PER: Proposal of Environmental Remediation

WP: Web Page
TP: Thesis Profiles

Nº	Doc	Art	#	TECHNIQUE			PAGES		REFERENCE
					FROM	TO	# SPA	# ENG	
1	EDPL		1	Syntactic Transp.	Impersonal	Passive	2	3	has been developed
2	EDPL		2	Syntactic Transp.	Impersonal	Passive	3	5	can be appreciated
3	EDPL		3	Gramm. Transp.	Noun	Verb	5	7	coloured
4	EDPL		4	Syntactic Transp.	Impersonal	Passive	11	13	can be deducted
5	EDPL		5	Modulation			13	15	the previouw charts show
6	EDPL		6	Syntactic Transp.	Impersonal	Passive	14	16	can be appreciated
7	EDPL		7	Syntactic Transp.	Impersonal	Passive	18	20	must be considered
8	EDPL		8	Syntactic Transp.	Impersonal	Passive	18	20	is recommended
9	RHRS		1	Modified Literal			21	28	has become
10	RHRS		2	Modulation			4	7	achieve it
11	RHRS		3	Modulation			8	12	shows the following
12	RHRS		4	Modulation			17	23	But it is also a truth
13	RHRS		5	Syntactic Transp.	VN	NV	2	4	will be hard
14	RHRS		6	Syntactic Transp.	Impersonal	Passive	3	5	have been developed
15	RHRS		7	Syntactic Transp.	Impersonal	Passive	3	5	are not considered
16	RHRS		8	Syntactic Transp.	Impersonal	Passive	3	5	is being planned
17	RHRS		9	Syntactic Transp.	Impersonal	Passive	3	6	solutions must be found
18	RHRS		10	Syntactic Transp.	Impersonal	Passive	4	7	are still discharged
19	RHRS		11	Syntactic Transp.	Impersonal	Passive	5	8	could be found
20	RHRS		12	Syntactic Transp.	Impersonal	Passive	6	9	was started
21	RHRS		13	Syntactic Transp.	Impersonal	Passive	6	9	have been produced
22	RHRS		14	Syntactic Transp.	Impersonal	Passive	6	9	must be remedied
23	RHRS		15	Syntactic Transp.	Impersonal	Passive	7	11	must be done
24	RHRS		16	Syntactic Transp.	Impersonal	Passive	7	11	is extracted
25	RHRS		17	Syntactic Transp.	Impersonal	Passive	9	13	was determined
26	RHRS		18	Syntactic Transp.	Impersonal	Passive	9	14	was performed
27	RHRS		19	Syntactic Transp.	Impersonal	Passive	9	14	were deposited
28	RHRS		20	Syntactic Transp.	Impersonal	Passive	10	14	is summarized
29	RHRS		21	Syntactic Transp.	Impersonal	Passive	10	15	will remain
30	RHRS		22	Syntactic Transp.	Impersonal	Passive	12	17	were picked up
31	RHRS		23	Syntactic Transp.	Impersonal	Passive	12	17	were found
32	RHRS		24	Syntactic Transp.	Impersonal	Passive	12	18	were collected
33	RHRS		25	Syntactic Transp.	Impersonal	Passive	13	19	were collected
34	RHRS		26	Syntactic Transp.	Impersonal	Passive	13	19	four samples
35	RHRS		27	Syntactic Transp.	Impersonal	Passive	14	19	has become
36	RHRS		28	Syntactic Transp.	Impersonal	Passive	17	23	is proposed
37	RHRS		29	Syntactic Transp.	Impersonal	Passive	18	23	is carried out
38	RHRS		30	Syntactic Transp.	Impersonal	Passive	18	24	will be needed
39	RHRS		31	Syntactic Transp.	Impersonal	Passive	18	24	will be needed
40	RHRS		32	Syntactic Transp.	Impersonal	Passive	19	24	must be installed
41	RHRS		33	Syntactic Transp.	Impersonal	Passive	19	25	must be considered
42	RHRS		34	Syntactic Transp.	Impersonal	Passive	21	28	is proposed
43	RHRS		35	Syntactic Transp.	Impersonal	Passive	22	29	is detailed
44	RHRS		36	Syntactic Transp.	Impersonal	Passive	23	30	is shown
45	RHRS		37	Syntactic Transp.	Impersonal	Passive	23	30	could be produced
46	RHRS		38	Syntactic Transp.	Impersonal	Passive	23	30	is concluded
47	RHRS		39	Syntactic Transp.	Impersonal	Passive	24	31	has been evident
48	RHRS		40	Syntactic Transp.	Impersonal	Passive	24	31	must be treated
49	RHRS		41	Gramm. Transp.	Noun	Verb	2	4	as standards require
50	RHRS		42	Syntactic Transp.	VN	NV	3	5	it is included
51	RHRS		43	Syntactic Transp.	VN	NV	3	6	will remain
52	RHRS		44	Syntactic Transp.	VN	NV	5	8	is urgent
53	RHRS		45	Syntactic Transp.	VN	NV	10	15	does not increase
54	RHRS		46	Syntactic Transp.	VN	NV	12	17	was necessary
55	RHRS		47	Syntactic Transp.	VN	NV	24	31	is totally feasible

56	WP	1	1	Syntactic Transp.	Impersonal	Passive	1	3	is made by hand
57	WP	1	2	Syntactic Transp.	Impersonal	Active personal	1	3	we want to tackle
58	WP	1	3	Syntactic Transp.	Impersonal	Active personal	1	3	we pursue
59	WP	2	4	Syntactic Transp.	Impersonal	Passive	1	3	will be proposed
60	WP	2	5	Syntactic Transp.	Impersonal	Passive	1	4	will be proposed
61	WP	3	6	Syntactic Transp.	Impersonal	Passive	2	4	is known
62	WP	3	7	Syntactic Transp.	Impersonal	Passive	2	4	can be supported
63	WP	3	8	Syntactic Transp.	Impersonal	Passive	2	4	can be obtained
64	WP	4	9	Syntactic Transp.	Impersonal	Passive	2	5	will be determined
65	WP	4	10	Syntactic Transp.	Impersonal	Passive	2	5	will be valued
66	WP	4	11	Syntactic Transp.	Impersonal	Passive	2	5	is needed
67	WP	5	12	Syntactic Transp.	Impersonal	Passive	3	5	will be generated
68	WP	5	13	Syntactic Transp.	Impersonal	Passive	3	5	will be generated
69	WP	5	14	Syntactic Transp.	Impersonal	Passive	3	5	can be dug
70	WP	5	15	Syntactic Transp.	Impersonal	Passive	3	6	will be indicated
71	WP	5	16	Syntactic Transp.	Impersonal	Passive	3	6	will be suggested
72	WP	6	17	Syntactic Transp.	Impersonal	Passive	3	6	must be considered
73	WP	7	18	Syntactic Transp.	Impersonal	Passive	4	7	is known
74	WP	7	19	Syntactic Transp.	Impersonal	Passive	4	7	is taken into account
75	WP	7	20	Syntactic Transp.	Impersonal	Passive	4	7	is considered
76	WP	7	21	Syntactic Transp.	Impersonal	Passive	4	7	will be carried out
77	WP	7	22	Syntactic Transp.	Impersonal	Passive	4	7	will be evaluated
78	WP	7	23	Syntactic Transp.	Impersonal	Passive	4	7	will be registered
79	WP	7	24	Syntactic Transp.	Impersonal	Passive	4	7	will be developed
80	WP	8	25	Syntactic Transp.	Impersonal	Passive	4	8	must be eliminated
81	WP	9	26	Syntactic Transp.	Impersonal	Passive	5	8	is being adapted
82	WP	9	27	Syntactic Transp.	Impersonal	Passive	5	8	will be supplied with
83	WP	9	28	Syntactic Transp.	Impersonal	Passive	5	8	will be built
84	WP	9	29	Syntactic Transp.	Impersonal	Passive	5	8	will be developed
85	WP	9	30	Syntactic Transp.	Impersonal	Passive	5	8	will be obtained
86	WP	9	31	Syntactic Transp.	Impersonal	Passive	5	8	will be developed
87	WP	9	32	Syntactic Transp.	Impersonal	Passive	5	8	will be carried out
88	WP	9	33	Modified Literal			5	9	will be carried out
89	WP	10	34	Syntactic Transp.	Impersonal	Passive	6	9	will be evaluated
90	WP	11	35	Syntactic Transp.	Impersonal	Passive	6	10	is recognized
91	WP	11	36	Syntactic Transp.	Impersonal	Passive	6	10	can be recognized
92	WP	11	37	Syntactic Transp.	Impersonal	Passive	6	10	is known
93	WP	11	38	Syntactic Transp.	Impersonal	Passive	6	10	will be collected
94	WP	11	39	Syntactic Transp.	Impersonal	Passive	6	10	will be signed
95	WP	11	40	Syntactic Transp.	Impersonal	Passive	6	10	will be developed
96	WP	11	41	Syntactic Transp.	Impersonal	Passive	6	10	will be assessed
97	WP	11	42	Syntactic Transp.	Impersonal	Passive	6	10	will be drawn
98	WP	12	43	Syntactic Transp.	Impersonal	Passive	7	10	will be developed
99	WP	12	44	Syntactic Transp.	Impersonal	Passive	7	11	will be designed
100	WP	13	45	Syntactic Transp.	Impersonal	Passive	7	11	is proposed
101	WP	13	46	Syntactic Transp.	Impersonal	Passive	7	11	will be developed
102	WP	13	47	Syntactic Transp.	Impersonal	Passive	7	11	will be obtained
103	WP	13	48	Syntactic Transp.	Impersonal	Passive	7	11	will be obtained
104	WP	13	49	Syntactic Transp.	Impersonal	Passive	7	11	will be visited
105	WP	13	50	Syntactic Transp.	Impersonal	Passive	7	11	will be studied
106	WP	14	51	Syntactic Transp.	Impersonal	Passive	8	12	is proved
107	WP	14	52	Syntactic Transp.	Impersonal	Passive	8	12	are meant ot be made
108	WP	14	53	Syntactic Transp.	Impersonal	Passive	8	12	might be destroyed
109	WP	14	54	Syntactic Transp.	Impersonal	Passive	8	12	will be produced
110	WP	14	55	Syntactic Transp.	Impersonal	Passive	8	12	are performed
111	WP	14	56	Syntactic Transp.	Impersonal	Passive	8	12	will be needed
112	WP	15	57	Syntactic Transp.	Impersonal	Passive	9	13	will be developed
113	WP	15	58	Syntactic Transp.	Impersonal	Passive	9	13	will be analised
114	WP	15	59	Syntactic Transp.	Impersonal	Passive	9	13	will be tried
115	WP	15	60	Syntactic Transp.	Impersonal	Passive	9	13	will be emphasized
116	WP	15	61	Syntactic Transp.	Impersonal	Passive	9	13	will be developed
117	WP	16	62	Syntactic Transp.	Impersonal	Passive	9	14	will be developed
118	WP	16	63	Syntactic Transp.	Impersonal	Passive	10	14	must be taken into account
119	WP	16	64	Syntactic Transp.	Impersonal	Passive	10	14	will be chosen
120	WP	17	65	Syntactic Transp.	Impersonal	Passive	10	14	is obtained
121	WP	17	66	Syntactic Transp.	Impersonal	Passive	10	14	is applied

122	WP	17	67	Syntactic Transp.	Impersonal	Passive	10	14	is called
123	WP	17	68	Syntactic Transp.	Impersonal	Passive	10	15	is used
124	WP	17	69	Syntactic Transp.	Impersonal	Passive	10	15	is boosted
125	WP	17	70	Syntactic Transp.	Personal	Passive	10	15	are posed
126	WP	17	71	Syntactic Transp.	Impersonal	Passive	10	15	are well adapted
127	WP	17	72	Syntactic Transp.	Impersonal	Passive	10	15	can be employed
128	WP	17	73	Syntactic Transp.	Impersonal	Passive	10	15	can be recycled
129	WP	17	74	Syntactic Transp.	Impersonal	Active personal	11	15	we will count on
130	WP	18	75	Syntactic Transp.	Impersonal	Passive	11	15	is raised
131	WP	18	76	Modulation			11	16	will be able to …
132	WP	19	77	Syntactic Transp.	Impersonal	Passive	11	16	will be planned
133	WP	19	78	Syntactic Transp.	Impersonal	Passive	11	16	will be emphasized
134	WP	20	79	Syntactic Transp.	Impersonal	Passive	12	17	will be fed
135	WP	20	80	Syntactic Transp.	Impersonal	Passive	12	17	can be obtained
136	WP	20	81	Syntactic Transp.	Impersonal	Passive	12	17	will be developed
137	WP	21	82	Syntactic Transp.	Impersonal	Passive	13	17	must be created
138	WP	22	83	Syntactic Transp.	Impersonal	Passive	13	18	is not clarified
139	WP	22	84	Syntactic Transp.	Impersonal	Passive	13	19	is posed
140	WP	23	85	Syntactic Transp.	Impersonal	Passive	14	20	will be studied
141	WP	23	86	Syntactic Transp.	Impersonal	Passive	14	20	is ensured
142	WP	23	87	Syntactic Transp.	Impersonal	Passive	15	20	will be applied
143	WP	23	88	Syntactic Transp.	Impersonal	Passive	15	20	will be applied
144	WP	23	89	Syntactic Transp.	Impersonal	Passive	15	20	will be measured
145	WP	23	90	Syntactic Transp.	Impersonal	Passive	15	20	will be registered
146	WP	23	91	Syntactic Transp.	Impersonal	Passive	15	20	will be developed
147	WP	24	92	Syntactic Transp.	Impersonal	Passive	15	20	is cultivated
148	WP	24	93	Syntactic Transp.	Impersonal	Passive	15	20	will be produced
149	WP	25	94	Syntactic Transp.	Impersonal	Passive	15	21	will be carried out
150	WP	25	95	Syntactic Transp.	Impersonal	Passive	16	21	will be carried out
151	WP	26	96	Syntactic Transp.	Impersonal	Passive	16	21	are eliminated
152	WP	26	97	Syntactic Transp.	Impersonal	Passive	16	21	will be characterized
153	WP	26	98	Syntactic Transp.	Impersonal	Passive	16	21	will be studied
154	WP	26	99	Syntactic Transp.	Impersonal	Passive	16	22	will be carried out
155	WP	27	100	Syntactic Transp.	Impersonal	Passive	16	22	is required
156	WP	27	101	Syntactic Transp.	Impersonal	Passive	16	22	is sold
157	WP	27	102	Syntactic Transp.	Impersonal	Passive	16	22	will be carried out
158	WP	28	103	Syntactic Transp.	Impersonal	Passive	17	23	will be developed
159	WP	30	104	Modulation			18	23	coexists
160	WP	30	105	Syntactic Transp.	Impersonal	Passive	18	23	would have been accomplished
161	WP	30	106	Syntactic Transp.	Impersonal	Passive	18	23	has een developed
162	WP	30	107	Syntactic Transp.	Impersonal	Passive	18	24	we can achieve
163	WP	30	108	Syntactic Transp.	Impersonal	Passive	18	24	will be implemented
164	WP	32	109	Syntactic Transp.	Impersonal	Passive	19	24	must be increased
165	WP	32	110	Syntactic Transp.	Impersonal	Passive	19	24	must be rebuilt
166	WP	32	111	Syntactic Transp.	Impersonal	Passive	19	24	will be observed
167	WP	32	112	Syntactic Transp.	Impersonal	Passive	19	24	will be done
168	WP	33	113	Syntactic Transp.	Impersonal	Passive	20	26	can be recommended
169	WP	34	114	Syntactic Transp.	Impersonal	Passive	20	27	are proposed
170	WP	34	115	Syntactic Transp.	Impersonal	Passive	21	27	will be applied
171	WP	34	116	Syntactic Transp.	Impersonal	Passive	21	27	the aim is
172	WP	34	117	Syntactic Transp.	Impersonal	Passive	21	27	will be carried out
173	TP	1	1	Modulation			1	2	has been used
174	TP	1	2	Syntactic Transp.	Impersonal	Passive	1	2	are given
175	TP	1	3	Modulation			2	2	the closest concept is known
176	TP	1	4	Syntactic Transp.	Impersonal	Passive	2	2	are developed
177	TP	1	5	Syntactic Transp.	Impersonal	Passive	2	2	are evaluated
178	TP	1	6	Syntactic Transp.	Impersonal	Passive	2	3	is presented
179	TP	1	7	Modulation			2	3	there is
180	TP	2	8	Syntactic Transp.	Impersonal	Passive	5	7	is limited
181	TP	2	9	Modified Literal			5	7	take place
182	TP	2	10	Modulation			5	8	it has been heard
183	TP	2	11	Syntactic Transp.	Impersonal	Passive	5	8	were helped
184	TP	3	12	Gramm. Transp.	Verb	Conjunction	9	13	because
185	TP	3	13	Syntactic Transp.	Impersonal	Passive	9	13	were forced
186	TP	3	14	Syntactic Transp.	Impersonal	Passive	10	15	will be considered
187	TP	3	15	Syntactic Transp.	Impersonal	Active personal	10	15	will be carried out

188	TP	3	16	Syntactic Transp.	Impersonal	Passive	10	15	we will incide
189	TP	3	17	Syntactic Transp.	Impersonal	Passive	10	15	will be evaluated
190	TP	3	18	Syntactic Transp.	Impersonal	Passive	10	15	will be determined
191	TP	3	19	Syntactic Transp.	Impersonal	Passive	10	15	will be designed
192	TP	4	20	Syntactic Transp.	Reflexive	Active personal	11	17	have decreased
193	TP	4	21	Gramm. Transp.	Verb	Noun	11	18	there is a lack
194	TP	4	22	Syntactic Transp.	Impersonal	Passive	11	18	are distinguished
195	TP	4	23	Syntactic Transp.	Impersonal	Passive	11	18	have been developed
196	TP	4	24	Syntactic Transp.	Impersonal	Passive	12	18	is at our disposal
197	TP	5	25	Syntactic Transp.	Impersonal	Passive	14	22	is needed
198	TP	5	26	Syntactic Transp.	Impersonal	Passive	15	23	were registered
199	TP	5	27	Syntactic Transp.	Impersonal	Active personal	15	23	you can notice
200	TP	5	28	Syntactic Transp.	Impersonal	Passive	15	24	can it be inserted
201	TP	6	29	Syntactic Transp.	Impersonal	Passive	17	26	has been generated
202	TP	6	30	Syntactic Transp.	Impersonal	Passive	19	28	will be carried out
203	TP	6	31	Syntactic Transp.	Impersonal	Passive	19	29	will be established
204	TP	7	32	Syntactic Transp.	Impersonal	Passive	20	30	are developed
205	TP	7	33	Syntactic Transp.	Impersonal	Passive	20	30	will be carried out
206	TP	7	34	Syntactic Transp.	Impersonal	Active personal	20	30	we will proceed
207	TP	7	35	Syntactic Transp.	Impersonal	Passive	20	30	must be established
208	TP	7	36	Syntactic Transp.	Impersonal	Passive	20	31	must be studiet
209	TP	7	37	Syntactic Transp.	Impersonal	Passive	20	31	must be recommended
210	TP	7	38	Syntactic Transp.	Impersonal	Passive	21	31	are being enabled
211	TP	7	39	Syntactic Transp.	Impersonal	Passive	21	32	were analised
212	TP	7	40	Syntactic Transp.	Impersonal	Passive	21	32	are formed
213	TP	7	41	Syntactic Transp.	Impersonal	Passive	21	32	is carried out
214	TP	7	42	Syntactic Transp.	Impersonal	Passive	21	32	could be proven
215	TP	7	43	Syntactic Transp.	Impersonal	Passive	21	32	can it be explained
216	TP	7	44	Syntactic Transp.	Impersonal	Passive	22	33	will be identified
217	TP	7	45	Syntactic Transp.	Impersonal	Passive	22	33	will be collected
218	TP	7	46	Syntactic Transp.	Impersonal	Passive	22	33	will be evaluated
219	TP	7	47	Syntactic Transp.	Impersonal	Passive	22	33	will be analised
220	TP	7	48	Syntactic Transp.	Impersonal	Passive	22	34	will be identified
221	TP	7	49	Syntactic Transp.	Impersonal	Passive	22	34	will be determined
222	TP	7	50	Syntactic Transp.	Impersonal	Passive	23	34	will be determined
223	TP	7	51	Syntactic Transp.	Impersonal	Passive	23	34	will be studied
224	TP	8	52	Syntactic Transp.	Impersonal	Passive	24	35	is aimed at
225	TP	8	53	Syntactic Transp.	Impersonal	Passive	26	38	are coupled
226	TP	8	54	Syntactic Transp.	Impersonal	Passive	26	38	will be developed
227	TP	8	55	Modulation			27	38	in order to provide
228	TP	9	56	Syntactic Transp.	Impersonal	Passive	30	42	are added
229	TP	9	57	Syntactic Transp.	Impersonal	Passive	30	42	are accumulated
230	TP	9	58	Syntactic Transp.	Impersonal	Passive	30	42	are recycled
231	TP	9	59	Syntactic Transp.	Impersonal	Adjective	30	42	produced
232	TP	9	60	Syntactic Transp.	Impersonal	Passive	30	43	must be solved
233	TP	9	61	Syntactic Transp.	Impersonal	Passive	30	43	are they distributed
234	TP	9	62	Modulation			30	43	can be suggested
235	TP	9	63	Syntactic Transp.	Impersonal	Passive	31	44	will be based
236	TP	9	64	Syntactic Transp.	Impersonal	Passive	31	44	will be carried out
237	TP	9	65	Syntactic Transp.	Impersonal	Passive	31	44	will be carried out
238	TP	9	66	Syntactic Transp.	Impersonal	Passive	31	44	will be chosen
239	TP	9	67	Syntactic Transp.	Impersonal	Passive	31	44	will be carried out
240	TP	10	68	Syntactic Transp.	Impersonal	Passive	33	47	will be used
241	TP	10	69	Syntactic Transp.	Impersonal	Passive	34	47	will be used
242	TP	10	70	Syntactic Transp.	Impersonal	Passive	34	47	will be used
243	TP	10	71	Syntactic Transp.	Impersonal	Passive	34	47	will be developed
244	TP	10	72	Modulation			34	47	will be provided
245	TP	10	73	Syntactic Transp.	Impersonal	Passive	34	47	will be registered
246	TP	10	74	Syntactic Transp.	Impersonal	Active personal	34	48	we will pay attention
247	TP	10	75	Syntactic Transp.	Impersonal	Passive	34	48	will be studied
248	TP	10	76	Modulation			34	48	it is more likely to improve …
249	TP	10	77	Syntactic Transp.	Impersonal	Passive	34	48	will be built
250	TP	10	78	Syntactic Transp.	Impersonal	Passive	34	48	will be carried out
251	TP	10	79	Syntactic Transp.	Impersonal	Passive	34	48	has been used
252	TP	10	80	Syntactic Transp.	Impersonal	Passive	35	48	have been reported
253	TP	10	81	Syntactic Transp.	Impersonal	Passive	35	49	have not been found yet

254	TP	11	82	Syntactic Transp.	Impersonal	Passive	38	52	will be studied
255	TP	11	83	Syntactic Transp.	Impersonal	Passive	38	52	will be considered
256	TP	11	84	Syntactic Transp.	Impersonal	Passive	38	52	obtained
257	TP	11	85	Syntactic Transp.	Impersonal	Passive	38	52	will be carried out
258	TP	11	86	Gramm. Transp.	Verb	Adjective	38	53	was experimented
259	TP	11	87	Syntactic Transp.	Impersonal	Passive	38	53	were obtained
260	TP	11	88	Syntactic Transp.	Impersonal	Passive	39	53	it was possible to decrease…
261	TP	11	89	Syntactic Transp.	Impersonal	Passive	39	54	could be solved
262	TP	11	90	Syntactic Transp.	Impersonal	Passive	40	55	is developed
263	TP	11	91	Syntactic Transp.	Impersonal	Passive	40	55	is directed
264	TP	11	92	Syntactic Transp.	Impersonal	Passive	40	55	will be developed
265	TP	11	93	Syntactic Transp.	Impersonal	Passive	41	56	will be known
266	TP	11	94	Syntactic Transp.	Impersonal	Passive	41	56	will have been obtained
267	TP	11	95	Syntactic Transp.	Impersonal	Passive	41	56	will be identified
268	TP	12	96	Syntactic Transp.	Impersonal	Passive	42	57	will be carried out
269	TP	12	97	Syntactic Transp.	Impersonal	Passive	43	58	are proposed
270	TP	12	98	Syntactic Transp.	Impersonal	Passive	43	58	are developed

ANNEX 4

TERMINOLOGICAL ANALYSIS

TERMINOLOGICAL ANALYSIS

Nº	Spanish Entry	Gr. C.	Etymology		Area	Definition	Source	English Equivalent	Observations	
			Origin	Meaning					Prop	
1	Abanico Aluvial	n.	Portugués - Latín	port. Abano / lat. alluvĭes, aluvión	Ing.	Una acumulación de materiales aluviales, formados donde los cursos de agua con gradiente empinada contienen su velocidad abruptamente al fluir sobre un declive de ligera inclinación; formada generalmente como un abanico abierto o un segmento de un cono.	http://www.ecoportal.net/content/view/full/70880	Alluvial Fans		
2	Abertura de Descarga	n.	Latín	lat. Apertūra, /lat. carrus, carro	Ing.	Lugar por donde se descargan los minerales.	Own definition	Discharge Opening		
3	Abiótico	adj.	Griego	sin vida	Zoo.	Caracterizado por la ausencia de vida. Sustancias abióticas son compuestos inorgánicos y orgánicos básicos, como agua, dióxido de carbono, oxígeno, calcio, nitrógeno, y sales de fósforo, aminoácidos y ácidos húmicos, entre otros. Lo mismo que azoico, esto es, período de la historia física de la tierra… sin organismos vivos	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,A/Itemid,99999999/catid,82/page,1/	Abiotic		
4	Abono orgánico	n.	Latín	lat. bonus, bueno / lat. Organĭcus	Agr.	material cuya función principal es proporcionar elementos nutrientes a las plantas. Los abonos orgánicos son generalmente de origen animal o vegetal.	http://es.wikipedia.org/wiki/Abono	Organic Fertilizer		
5	Acabado (piso)	n.	Latín	lat. caput, cabeza	Arq.	Perfeccionamiento final de una obra o labor:	http://www.wordreference.com/definicion/acabado	Finish of the dwelling floor		
6	Accesiones	n.	Latín	accessĭo, -ōnis	Der	Modo de adquirir el dominio, según el cual el propietario de una cosa hace suyo, no solamente lo que ella produce, sino también lo que se le une o incorpora por obra de la naturaleza o por mano del hombre, o por ambos medios a la vez, siguiendo lo accesorio a lo principal	www.rae.es	Accessions		
7	Accidentada	adj.	Latín	accidere (suceder); ad + cadere (caerse)	Geo.	terreno que es difícil de atravesar por sus desniveles	http://es.thefreedictionary.com/accidentado	Rugged	Syn.	Broken
8	Aceite Crudo	n.	Árabe	el árabe الزيت (az-zayt),	Qmc.	El aceite que proviene de un yacimiento, después de separarle cualquier gas asociado y procesado en una refinería; a menudo se le conoce como crudo.	http://energia.glosario.net/terminos-petroleo/aceite-crudo-1812.html	Crude Oil		
9	Acidez	n.	Latín	acidus	Qmc.	La acidez de una sustancia es el grado en el que es ácida. El concepto complementario es la basicidad.	http://es.wikipedia.org/wiki/Acidez	Acidity		
10	Acidificación	n.	Latín	acidus	Qmc.	acción de acidificar	www.rae.es	Acidification		
11	Ácido Clorhídrico	n.	Latín y Griego	acidus /χλωρος, que significa "amarillo verdoso	Qmc.	es una disolución acuosa del gas cloruro de hidrógeno (HCl).	http://es.wikipedia.org/wiki/%C3%81cido_clorh%C3%ADdrico	Hydrochloric Acid		
12	Ácido Graso	n.	Latín	acidus / crassus, "gordo" a través del latín vulgar grassa	Qmc.	Un ácido graso es una biomolécula orgánica de naturaleza lipídica formada por una larga cadena hidrocarbonada lineal, de número par de átomos de carbono, en cuyo extremo hay un grupo carboxilo.	http://es.wikipedia.org/wiki/Acidos_grasos	Fatty Acids		
13	Ácido sulfúrico	n.	Latín	acidus /latín sulphur)	Qmc.	es un compuesto químico muy corrosivo cuya fórmula es H2SO4	http://es.wikipedia.org/wiki/%C3%81cido_sulf%C3%BArico	Sulphuric Acid		

14	Acondicionamiento	n.	Latín	latín condicio,	Arq.	Disposición de algo en las condiciones adecuadas	www.wordreference.com/.../acondicionamiento	Conditioning		
15	Acople Magnético	n.	Latín	copulāre, juntar / magnetum	Ing.	enómeno físico por el cual el paso de una corriente eléctrica variable en el tiempo por una bobina produce una diferencia de potencial entre los extremos de las demás bobinas del circuito. Cuando este fenómeno se produce de forma indeseada se denomina diafonía	http://es.wikipedia.org/wiki/Acoplamiento_magn%C3%A9tico	Magnetic Linkage		
16	Acotado	adj.	Latín	Cautus Prudente	Topog.	Topográfico que muestra cotas o marcas de altitud	http://www.wordreference.com/definicion/acotado	Enclosed		
17	Actinomiceto	n.	Griego	de "actino-" y "-mices" o "-miceto"	Zoo.	Microorganismo productor de la actinomicosis.	http://www.acanomas.com/Diccionario-Espanol/50743/ACTINOMICETO.htm	Actinomicet		
18	Actividad Tectónica	n.	Latín	activus	Geo.	(sismos, formación de montañas, actividad volcánica	es.wikipedia.org/wiki/Tectónica_de_placas	Tectonic Activity		
19	Activos Fijos	n.	Latín	activus	Eco.	Los activos fijos son aquellos que no varían durante el ciclo de explotación de la empresa	http://es.wikipedia.org/wiki/Activo_fijo	Fixed Assets		
20	Acuífero	n.	Latín	aqua	Geo.	Zona terrestre con rocas permeables capaces de retener cantidades de agua que pueden ser explotables. Si su parte superficial está en contacto con la atmósfera, se denomina acuífero libre; si está cubierto por rocas impermeables y el agua retenida está a presión mayor que la atmosférica, se denomina acuífero confinado.	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,A/Itemid,99999999/catid,82/limit,50/limitstart,0/	Aquifer		
21	Aculturación	n.	Latín	latín cultūra, "cultivo",	Otr.	resultado de un proceso en el cual una persona o un grupo de ellas adquiere una nueva cultura (o aspectos de la misma), generalmente a expensas de la cultura propia y de forma involuntaria.	http://es.wikipedia.org/wiki/Aculturaci%C3%B3n	Acculturation		
22	Adsorción	n.	Latín	latín, absorptiōn como sustantivo abstracto derivado del verbo absorbēr, con el significado de tragar, devorar.	Ing.	Adhesión, provocada por atracciones eléctricas o químicas, de las moléculas de un gas, un líquido o una sustancia disuelta en una superficie	http://ciencia.glosario.net/ecotropia/adsorci%F3n-9277.html	Adsorption		
23	Aerogenerador	n.	Latín	generare	Elec.	generador que convierte la energía cinética del viento (energía eólica) en energía eléctrica	http://www.consumoteca.com/suministros/energia/aerogenerador	Aerogenerator		
24	Afloramiento	n.	Latín	flosa	Geo.	Lugar donde asoma a la superficie terrestre un filón, masa rocosa o capa mineral consolidados en el subsuelo:	http://www.wordreference.com/definicion/afloramiento	Outcrop		
25	Agromorfológica	adj.	Griego	L ager, agri, campo/ G μορφο- y -μορφος/ager, agri, campo	Agr.	Estudio morfológico del campo o de un elemento componente	Own definition	Agromorphological		
26	Agua Ácida	n.	Latín	Aqua Acidus	Qmc.	Agua que contiene una cantidad de sustancias ácidas que hacen al pH estar por debajo de 7,0	http://www.definicion.org/agua-acida	Acid Water	Sin.	Agua de Copajira
27	Agua residual	n.	Latín	Aqua/ residŭum	Ing.	aquella que procede del empleo de un agua natural, o de la red, en un uso determinado	www.ambientum.com/.../CLSFCCNG1.asp	Waste Water		
28	Aguas Abajo		Latín	aqua / bassus	hidr.	Es el contrario de la definición anterior. También se puede decir río arriba. En castellano se utiliza también el término asuso con el mismo significado	http://es.wikipedia.org/wiki/Definiciones_usuales_en_hidrolog%C3%ADa	Downstream	Syn.	lower reaches

29	Aguas arriba		Latín	aqua /ad ripam, a la orilla	hidr.	Con relación a una sección de un curso de agua, se dice que un punto está aguas abajo, si se sitúa después de la sección considerada, avanzando en el sentido de la corriente. Otra expresión también usada es río abajo. En castellano se utiliza también el término ayuso para referirse a aguas abajo	http://es.wikipedia.org/wiki/Definiciones_usuales_en_hidrolog%C3%ADa	upstream		
30	Aguas Negras	n.	Latín	aqua / niger, nigri	hidr.	Fluidos procedentes de vertidos cloacales, de instalaciones de saneamiento; son líquidos con materia orgánica, fecal y orina, que circulan por el alcantarillado.	http://www.construmatica.com/construpedia/Aguas_Negras	Sewage Water	Sin.	Aguas Residuales, Servidas o Cloacales.
31	Alcalinidad	n.	Árabe	alqali	hidr.	La alcalinidad significa la capacidad tapón del agua; la capacidad del agua de neutralizar. Evitar que los niveles de pH del agua lleguen a ser demasiado básico o ácido. Es También añadir carbón al agua. La alcalinidad estabiliza el agua en los niveles del pH alrededor de 7. Sin embargo, cuando la acidez es alta en el agua la alcalinidad disminuye, puede causar condiciones dañinas para la vida acuática.	http://www.definicion.org/alcalinidad	Alkalinity		
32	Alfa alfa	n.	Latín	Medicago sativa	Agr.	Planta herbácea de la familia de las leguminosas, de hasta 1 m de altura, con hojas alternas compuestas y flores en racimos axilares de color azul violáceo, que se cultiva para forraje o alimento del ganado	http://www.wordreference.com/definicion/Planta	Alfalfa		
33	Alúmina	n.	Latín	Alumen	Qmc.	oxido de aluminio (Al2O3) Material cerámico muy versátil, sus propiedades la hacen especialmente apta para aplicaciones en donde la temperatura es un factor critico, además de su relativa facilidad para adaptarse a diversos trabajos y usos.	http://html.rincondelvago.com/alumina.html	Alumina		
34	Aluminio Al	n.	Latín	Alumen	Qmc.	elemento químico, de símbolo Al y número atómico 13. Se trata de un metal no ferromagnético. Es el tercer elemento más común encontrado en la corteza terrestre.	http://es.wikipedia.org/wiki/Aluminio	Aluminium		
35	Amonio	n.	Latín del Griego	Ammoniacus del griego /ammoniakón/	Qmc.	catión poliatómico cargado positivamente, de fórmula química NH4+. Tiene una masa molecular de 18,05 y está formado por la protonación de amoníaco (NH3).	http://es.wikipedia.org/wiki/Amonio_%28qu%C3%ADmica%29	Ammonium		
36	Amortización	n.	Latín	admortizare	Eco.	devolución, generalmente fraccionada en el tiempo, del capital de la empresa, bien sea del capital propio o del ajeno.	http://es.mimi.hu/economia/amortizacion.html	Amortization		
37	Análisis de flujo	n.	Latín	analysis /fluxus	Eco.	análisis de la entrada y salida de fondos de una empresa	Own definition	Analysis of Flow	Syn.	Flow Analysis
38	Análisis de Sensibilidad	n.	Latín	analysis /lat. sensibilĭtas, -ātis	Eco.	Método que permite, dentro de lo posible, estimar el Impacto de las variaciones de los factores más importantes en las Utilidades y, consecuentemente, en la tasa interna de rendimiento en forma tal que podamos conocer el Impacto en dicha tasa de una variación en ventas, Costos, etc	http://www.mailxmail.com/curso-indicadores-financieros/analisis-sensibilidad	Sensitivity Analysis		
39	Análisis Microbiológico	n.	Latín y Griego	analysis /griego «βιος» bios, vida, y «λόγος» logos, razonamiento, estudio, ciencia	Ing.	Cultivo microbiológico de la sangre, en el laboratorio, para determinar el germen responsable de una supuesta infección. También permite conocer el antibiótico más adecuado para combatirla.	http://es.mimi.hu/medicina/microbiologico.html	Microbiologic Analysis		

40	Análisis Sensorial	n.	Latín	analysis /sensorĭus	Ing.	El Análisis Sensorial o Evaluación Sensorial es el análisis de los alimentos u otros materiales a través de los sentidos (Anzaldúa-Morales, 1991). Es una disciplina científica usada para evocar, medir, analizar e interpretar las reacciones a aquellas características de los alimentos que se perciben por los sentidos de la vista, el oído, el olfato, el gusto y el tacto, por lo tanto, la evaluación sensorial no se puede realizar mediante aparatos de medida, el "instrumento" utilizado son personas perfectamente entrenadas	http://www.portalechero.com/ver_items_descrip.asp?wVarItem=1276	Sensorial analysis		
41	Antimonio Sb	n.	Egipcio	stmy	Qmc.	El antimonio es un elemento químico de número atómico 51 situado en el grupo 15 de la tabla periódica de los elementos. Su nombre y abreviatura (Sb) procede de estibio, término hoy ya en desuso, que a su vez procede del latín stibium ("Banco de arena gris brillante"), donde se deriva la palabra Estibio	http://es.wikipedia.org/wiki/Antimonio	Antimony		
42	Antrópica	adj.	Griego	griego antiguo ἄνθρωπος, "humano"	Otr.	Lo relativo (por estar asociado, influido, ser perteneciente o incluso contemporáneo) al hombre entendido como especie humana o ser humano (etimológicamente proviene del griego άνθρωπος -anthropos-).[1] Se utiliza sobre todo en contextos científicos (biología, ciencias de la Tierra, física y cosmología	http://es.wikipedia.org/wiki/Antr%C3%B3pico	Anthropogenic		
43	Antropógena	adj.	Griego	griego antiguo ἄνθρωπος, "humano"	Otr.	riginado por la actividad humana (factores antrópicos, riesgos antrópicos, etc	http://es.wikipedia.org/wiki/Antr%C3%B3pico	Anthropogenic	Sin.	Antropogénico
44	Antropogénico	adj.	Griego	griego antiguo ἄνθρωπος, "humano"	Ing.	riginado por la actividad humana (factores antrópicos, riesgos antrópicos, etc	http://es.wikipedia.org/wiki/Antr%C3%B3pico	Anthropogenic	Sin.	Antropógena
45	Aporte (de agua)	n.	Latín	portāre	Ing.	Acción y efecto de depositar materiales un río, un glaciar, el viento, etc.	www.rae.es	Inflow	Sin.	Contribución
46	Arborización	n.	Latín	latín arborem, con el mismo significado,	Agr.	Accion y efecto de Cubrir de árboles un espacio de terreno	http://es.wiktionary.org/wiki/arborizar	Forestation		
47	Arbustal	n.	Latín	latín arbustum, con el mismo significado	Agr.	Relativo a los arbustos	Own definition	Brush		
48	Arbustivo	adj.	Latín	latín arbustum, con el mismo significado	Agr.	Con características parecidas a las de un arbusto	http://www.wordreference.com/definicion/Con	Shrub		
49	Arcilla	n.	Latín del Griego	[árgillos ἄργιλλος gr. 'arcilla'	Qmc.	Roca sedimentaria formada a partir de depósitos de grano muy fino, compuesta esencialmente por silicatos de aluminio hidratados	http://www.wordreference.com/definicion/arcilla	Clay		
50	Arena	n.	Latín	harena-hasena	Geo.	Conjunto de partículas desagregadas de las rocas y acumuladas en las orillas de los mares, los ríos o en capas de los terrenos de acarreo:	http://www.wordreference.com/definicion/arena	Sand		
51	Arenisca	n.	Latín	harena-hasena	Geo.	Roca sedimentaria de origen detrítico, formada con granillos de cuarzo unidos por un cemento silíceo, arcilloso, calizo o ferruginoso	http://www.wordreference.com/definicion/arenisca	Sandstone		
52	Arqueología	n.	Griego	griego: archaios, 'viejo' o 'antiguo', y logos, 'ciencia'.	Otr.	(del griego «ἀρχαίος» archaios (viejo o antiguo), y «λόγος» logos (ciencia o estudio) es una disciplina que estudia las sociedades a través de sus restos materiales, sean estos intencionales o no. Así, debemos dejar de lado la tradicional visión de que como «una ciencia auxiliar de la Historia, se ocupa de	http://es.wikipedia.org/wiki/Arqueolog%C3%ADa	Archaeology		

						la Prehistoria ya que complementa con documentos materiales aquellos períodos no suficientemente iluminados por las fuentes escritas»				
53	Arrastrar	v.	Latín	rastrum	Min.	Llevar a una persona o cosa por el suelo, tirando de ella	http://www.wordreference.com/definicion/arrastrar	Drag	Syn.	Scour
54	Arrastre	n.	Latín	rastrum	Min.	. Acción y resultado de llevar a una persona o cosa por el suelo, tirando de ella	http://www.wordreference.com/definicion/arrastre	Scour – Scouring		
55	Arrastre de Sedimentos	n.	Latín	rastrum / sedimentum	Min.	sedimentos que transporta una corriente de agua que son consecuencia natural de la degradación del suelo	http://fluidos.eia.edu.co/hidraulica/articuloses/interesantes/transportesedimentos/transpoertesedimentos.html	Sediment scour		
56	Arsénico Sb	n.	Latín del Griego	lat. arsenĭcum, y este del gr. ἀρσενικόν, de ἄρσην, varonil, macho	Qmc.	El arsénico (del persa Zarnikh, oropimente amarillo o bien del griego arsenikón, masculino) es un elemento químico de la tabla periódica cuyo símbolo es As y el número atómico es 33. En la tabla periódica de los elementos se encuentra en el quinto grupo principal. El arsénico se presenta raramente sólido, principalmente en forma de sulfuros. Pertenece a los metaloides, ya que muestra propiedades intermedias entre los metales y los no metales.	http://es.wikipedia.org/wiki/Ars%C3%A9nico	Arsenic		
57	Asecano	n.	Latín	siccanus.	Ing.	La agricultura de secano es aquélla en la que el hombre no contribuye con agua, sino que utiliza únicamente la que proviene de la lluvia. Las aceitunas provenientes de los olivos de secano tienen mayor rendimiento que las de regadío, ya que éstas no poseen tanta cantidad de agua y, por lo tanto, su porcentaje de aceite es mayor.	http://es.wikipedia.org/wiki/Agricultura_de_secano	non dry		
58	Asentamiento	n.	Latín	latín vulgar adsedentare, derivado del latín sedere 'estar sentado	Arq.	Lugar donde se asienta o establece una persona o una comunidad:	http://www.wordreference.com/definicion/asentamiento	Settlement		
59	Aspartame	n.	Derivado	Aspartil	Qmc.	edulcorante no calórico descubierto en 1965 y comercializado en los ochenta. Numerosas organizaciones nacionales e internacionales han evaluado la inocuidad del aspartamo y un comité internacional de expertos ha establecido un nivel de Ingesta Diaria Admisible (IDA)	http://es.wikipedia.org/wiki/Aspartamo	Aspartame		
60	Auditoría Ambiental de Línea Base	n.	Latín	/ ambĭens, -entis, que rodea o cerca	Ing.	Investigación sistemática sobre los métodos y procedimientos de trabajo en una empresa, en la medida en que son relevantes para los aspectos medioambientales. El resultado de la investigación es el informe de auditoría medioambiental, que presenta los puntos problemáticos en el funcionamiento medioambiental de la empresa.	http://www.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=&index=alt&srchtxt=AUDITORIA%20AMBIENTAL	Environmental Audits of Baseline		
61	Balance Másico	n.	Francés y Latín	Fr balance /lat Massa	Qmc.	la relación entre las cantidades de materias	http://forum.wordreference.com/showthread.php?t=1002936	Mass Balance		
62	Barrera Capilar	n.	Latín	L barra/ capillāris, de capillus, cabello	Min.	capa de material fino superpuesta a una capa de material granular (grava o arena)	www.h2ogeo.upc.es/seminarios/2006/seminari%20meritxell.pd	Capillar Barrier		
63	Beneficiar	v.	Latín	beneficĭum)	Agr.	Matar y descuartizar las reses para aprovechar su carne.	http://www.wordreference.com/definicion/carnear	Slaughter	Sin.	carnear
64	Béntico	n.	Latín	"béntico, bentos"	Zoo.	Organismos que viven y realizan sus funciones vitales en dependencia estricta de un substrato.	http://ciencia.glosario.net/medio-ambiente-acuatico/bent%F3nico-10257.html	Benthic	Sin.	Bentónico

65	Bentonita	n.	Epónimo	de Benton Shale (un lugar en eeuu	Geo.	Roca compuesta esencialmente por un material crístalino, semejante a una arcilla, formado por la desvitrificación y consiguiente alteración de un material ígneo vítreo, usualmente cenizas volcánicas o tobas. El mineral de la arcilla característico tiene hábito micáceo y fácil exfoliación, alta birrefringencia y una textura heredada de las cenizas volcánicas o de la toba	http://todacultura.com/glosarioceramica/bentonita.htm	Bentonite		
66	Berilio Be	n.	Griego	del griego βερυλλος berilo	Qmc.	1. Elemento químico metálico de color blanco y sabor dulce. Su símbolo es Be, y su número atómico, 4.	http://www.wordreference.com/definicion/berilio	Beryllium		
67	Bicarbonato HCO3	n.	Latín	carbo, -ōnis)	Qmc.	sales derivadas del ácido carbónico (H2CO3), que contienen el anión HCO3-.	http://es.wikipedia.org/wiki/Bicarbonato	Bicarbonate		
68	Bioacumulación	n.	Latín	accumulāre.	Agr.	acumulación neta, con el paso del tiempo, de metales (u otras sustancias persistentes) en un organismo a partir de fuentes tanto bióticas (otros organismos) como abióticas (suelo, aire y agua).	http://www.greenfacts.org/es/glosario/abc/bioacumulacion-bioacumular.htm	Bioaccumulation		
69	Biocombustible	n.	Latín	combustus, part. pas. de comburĕre, quemar enteramente	Amb.	a cualquier tipo de combustible que derive de la biomasa (organismos recientemente vivos o sus desechos metabólicos, tales como el estiércol de la vaca).	www.enreparaciones.com.ar/ahorro.../biocombustibles.php	Biofuel		
70	Biodegradable	adj.	Latín	gradus =paso, escalon	Amb.	que puede ser descompuesta con cierta rapidez por organismos vivientes, los más importantes de los cuales son bacterias aerobias. Sustancia que se descompone o desintegra con relativa rapidez en compuestos simples por alguna forma de vida como: bacterias, hongos, gusanos e insectos	http://www.biodegradable.com.mx/definicion_biodegradable.html	Biodegradable		
71	Biodiesel	n.	Epónimo	Rudolf Diesel	Amb.	combustible obtenido a partir de aceites vegetales que funciona en cualquier motor Diesel	http://www.overde.com.ar/FRAMES/informes/biodiesel.htm	Biodiesel		
72	Biomasa	n.	Latín	massa	Agr.	conjunto de recursos forestales, plantas terrestres y acuáticas, y de residuos y subproductos agrícolas, ganaderos, urbanos e industriale	http://html.rincondelvago.com/biomasa_1.html	Biomass		
73	Biósfera	n.	Latín del Griego	sphaera, "pelota", a su vez del griego σφαῖρα	Eclg.	sistema material formado por el conjunto de los seres vivos propios del planeta Tierra, junto con el medio físico que les rodea y que ellos contribuyen a conformar. Este significado de "envoltura viva" de la Tierra, es el de uso más extendido, pero también se habla de biosfera a veces para referirse al espacio dentro del cual se desarrolla la vida, también la biosfera es el conjunto de la litósfera, hidrósfera y la atmósfera.	http://es.wikipedia.org/wiki/Biosfera	Biosphere		
74	Biota	n.	Griego	[bio- βίος gr. 'vida' + -t(ēs) gr. 'dedicado a', 'propio de']	Bio.	Conjunto de seres vivos de una región	ttp://www.wordreference.com/definicion/biota	Biota		
75	Biótico	adj.	Griego	[bio- βίος gr. 'vida' + -t(ēs) gr. 'dedicado a', 'propio de']	Bio.	hace referencia a lo característico de los seres vivos o que está vinculado a ellos. También es aquello perteneciente o relativo a la biota (el conjunto de la flora y la fauna de una determinada región).	http://definicion.de/biotico/	Biotic		
76	biotipo		Latín del Griego	Typus del griego typos=modelo carácter grabado		biotipo, una forma de definirlo es la siguiente: "se trata de un grupo de individuos cuya composición genética determina que posean características comunes que los distinguen de otros grupos dentro de la misma especie".	Own definition			

77	Bomba Centrífuga	n.	Latín	bombus, "ruido" ; Centrum o fugere	Ing.	Son aquellas en que el fluido ingresa a ésta por el eje y sale siguiendo una trayectoria periférica por la tangente	http://tarwi.lamolina.edu.pe/~dsa/TBombas.htm	Centrifugal Pump		
78	Bombear	v.	Latín	bombus	Ing.	absorber energía mecánica que puede provenir de un motor eléctrico, térmico, etc., y transformarla en energía que la transfiere a un fluido como energía hidráulica la cual permite que el fluido pueda ser transportado de un lugar a otro, a un mismo nivel y/o a diferentes niveles y/o a diferentes velocidades.	http://tarwi.lamolina.edu.pe/~dsa/TBombas.htm	Pump		
79	Borato	n.	Árabe	buraq y éste del persa burah	Qmc.	Sal obtenida de la combinación del ácido bórico con una base	http://www.wordreference.com/definicion/borato	Borate		
80	Bromo Br	n.	Griego	del griego bromos, que significa "hedor"	Qmc.	Elemento químico metaloide líquido, de color pardo rojizo y olor fuerte, que es corrosivo y tóxico. Su símbolo es Br y su número atómico, 35	http://www.wordreference.com/definicion/bromo	Bromine		
81	Broncopulmonar	adj.	Griego y Latín	pneúm(ōn) πνεύμων, gr., 'pulmón' ;latín vulgar bruncus	Med.	relativo o perteneciente a los bronquios y los pulmones.	http://es.mimi.hu/medicina/broncopulmonar.html	Bronchopulmonary		
82	Buddle	n.			Ing.	máquina que sirve para realizar el lavado de minerales	http://www.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=&index=alt&__index=alt&srchtxt=ore+&comencsrch.x=0&comencsrch.y=0	Buddle		
83	Cabeza Calculada	n.	Latín	capitīa/ calculare	Ing.	mineral que ingresa a planta de concentración	http://martincarotti.blogspot.com/2009/06/regalias-y-retenciones-mineras-quien.html	Calculated Head		
84	Cabeza Ensayada	n.	Latín	lat. capitīa / lat. exagium, "peso	Min.	mena alimentada al molino.	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=cabeza	Tested head		
85	Cactácea	adj.	Latín	cactaceae	Agr.	De las cactáceas o relativo a esta familia de plantas.	http://www.wordreference.com/definicion/cact%C3%A1ceas	Cacti		
86	Cadmio Cd	n.	Latín del Griego	admia, y en griego kadmeia, que significa "calamina",	Qmc.	Elemento químico de número atómico 48 situado en el grupo 12 de la tabla periódica de los elementos. Su símbolo es Cd. Es un metal pesado, blanco azulado, relativamente poco abundante. Es uno de los metales más tóxicos.	http://es.wikipedia.org/wiki/Cadmio	Cadmium		
87	Calcio Ca	n.	Latín	calx, calis , cal)	Qmc.	Elemento químico, de símbolo Ca y de número atómico 20. Se encuentra en el medio interno de los organismos como ion calcio (Ca2+) o formando parte de otras moléculas; en algunos seres vivos se halla precipitado en forma de esqueleto interno o externo.	http://es.wikipedia.org/wiki/Calcio	Calcium		
88	Calibración	n.	Griego	kalopous= horma	Ing.	Accion y efecto de calibrar	http://www.wordreference.com/definicion/calibrar	Calibration		
89	Calicata	n.	Latín y Griego	latín, chalāre) significando penetrar, atravesar; y CATA (del gr. κατα)cuyo significado originariamente es "hacia abajo"	Ing.	o catas son una de las técnicas de prospección empleadas para facilitar el reconocimiento geotécnico, estudios edafológicos o pedológicos de un terreno. Son excavaciones de profundidad pequeña a media, realizadas normalmente con pala retroexcavadora	http://es.wikipedia.org/wiki/Calicata	Soil Pit Excavation		
90	Calidad del Aire	n.	Latín	ualītas, -ātis, y este calco del gr. ποιότης	Ing.	La calidad del aire trata de la composición del aire y de la idoneidad del éste para determinadas aplicaciones.	http://www.lenntech.es/faq-calidad-del-aire.htm#ixzz1MMZh7MQy	Air quality		

91	Caliza	n.	Latín	calcarius	Qmc.	Roca compuesta sobre todo de calcita, muy abundante en la naturaleza y utilizada en la construcción:	http://www.wordreference.com/definicion/calizo	Limestone		
92	Camada	n.	Latín	lat. de San Isidoro cama, por camba	Agr.	Conjunto de crías que paren de una vez las hembras de los animales	http://www.wordreference.com/definicion/camada	Litter	Syn.	kindle
93	Cambio Climático	n.	Latín	Cambio: latin cambium, Clima :Del latín clima, y éste, del griego κλίμα que signifa inclinación del sol.	Ing.	Fluctuaciones a largo plazo de la temperatura, las precipitaciones, los vientos y todas los demás componentes del clima en la Tierra.	http://www.greenfacts.org/es/glosario/abc/cambio-climatico.htm	Climate change		
94	Camélido	adj.	Hebreo	camello" proviene del hebreo gamal, que significa "devolver" o "compensar"	Agr.	De los camélidos o relativo a esta familia de rumiantes	http://www.wordreference.com/definicion/cam%C3%A9lido	Camelid		
95	Cantos	n.	Celta	cantus, llanta de metal de una rueda, voz de or. Celta	Ing.	pequeña, redonda roca fragmento de una granula mas grande .	http://buscon.rae.es/draeI/SrvltConsulta?TIPO_BUS=3&LEMA=canto	Stone		Pebble stone
96	Caolín	n.	Chino	mandarín 高岭, "montaña" (gāo líng)	Qmc.	caolinita, es una arcilla blanca muy pura que se utiliza para la fabricación de porcelanas y de aprestos para almidonar. También es utilizada en ciertos medicamentos y como agente adsorbente. Cuando la materia no es muy pura, se utiliza en fabricación de papel. Conserva su color blanco durante la cocción.	http://es.wikipedia.org/wiki/Caol%C3%ADn	Kaolinite		
97	Capital de Trabajo	n.	Latín	capital :Latín capitalis, trabajo: Latín tripaliare	Eco.	también denominado capital corriente, capital circulante, capital de rotación, fondo de rotación o fondo de maniobra), que es el excedente de los activos de corto plazo sobre los pasivos de corto plazo, es una medida de la capacidad que tiene una empresa para continuar con el normal desarrollo de sus actividades en el corto plazo. Se calcula restando, al total de activos de corto plazo, el total de pasivos de corto plazo	http://es.wikipedia.org/wiki/Capital_de_trabajo	Working Capital		
98	Capital Fijo	n.	Latín	capitalis; fijo lat figere	Eco.	principalmente es el nombre que se le da al capital que es inamovible, principalmente edificaciones, estructuras, y a los bienes de equipo	http://es.mimi.hu/economia/capital_fijo.html	Fixed Capital		
99	Captación	n.	Latín	lat. captāre,	Ing.	Acción y resultado de captar:	http://www.wordreference.com/definicion/captaci%C3%B3n	Captation	Syn.	Collection
##	Captador de agua de lluvias	n.	Latín	captāre, frec. de capĕre, coger/ Aqua/	Ing.	un gran paraguas invertido que, además de proteger de la lluvia a los que estén debajo, capta y canaliza el agua que cae y la lleva hasta un depósito subterráneo.	http://tec.nologia.com/2008/12/02/captador-de-agua/	Rainwater harvester		Rainwater Collector
##	Caracterización	n.	Latín	character)	Ing.	Determinación de los atributos peculiares de elementos de una sustancia, un ambiente o un proceso	http://www.wordreference.com/definicion/caracterizaci%C3%B3n	Characterization		
##	Caracterizar	v.	Latín	character)	Ing.	Determinar atributos peculiares de elementos de una sustancia, un ambiente o un proceso	http://buscon.rae.es/draeI/SrvltConsulta?TIPO_BUS=3&LEMA=caracterizar	Characterize		
##	Carbonato CO3	n.	Latín	carbo, -ōnis)	Qmc.	Sal resultante de la combinación del ácido carbónico con un radical.	http://www.wordreference.com/definicion/carbonato	Carbonate		
##	Carcasa	n.	Francés	Carcasse Anglo-L. carcosium	Agr.	cuerpo de animal muerto;	http://www.wordreference.com/es/translation.asp?tranword=carcass	Carcass		

##	Cárcavas	n.	Latín	lat. caccăbus, olla, infl. por concavāre, cavar	Geo.	1. Foso o zanja que suelen hacer las corrientes de agua al erosionar un terreno.	http://www.wordreference.com/definicion/c%C3%A1rcava	Erosion Gullies		
##	Carga	n.	Latín	at. vulg. carricāre, y este del lat. carrus, carro	Ing.	Cosa que pesa sobre otra:	http://www.wordreference.com/definicion/carga	Load	Syn.	Charge
##	Casiterita	n.	Griego	"kassiteros" que significa estaño.	geo.	Mineral brillante de color pardo, principal fuente de obtención del estaño.	http://www.wordreference.com/definicion/casiterita	Cassiterite		
##	Catalizador	n.	Griego	gr. κατάλυσις, disolución, acabamiento	Qmc.	Elemento capaz de producir la catálisis:	http://www.wordreference.com/definicion/catalizador	Catalyst		
##	Caudal	n.	Latín	capitālis, capital)	Ing.	volumen de agua que pasa por una determinada sección transversal en la unidad de tiempo, generalmente se expresan en m3/s.	http://es.wikipedia.org/wiki/Definiciones_usuales_en_hidrolog%C3%ADa	Flow	Sin.	Corriente
##	Cemento	n.	Latín	at. cementum, usado en la Vulgata por argamasa	Arq.	Mezcla de arcilla molida y materiales calcáreos en polvo que, en contacto con el agua, se solidifica y endurece. Se utiliza como adherente y aglutinante en la construcción.	http://www.wordreference.com/definicion/cemento	Cement		
##	Ceniza volcánica	n.	L-Port	cinisia, con el mismo significado, a su vez de cinis; portugués volcão	Min.	composición de partículas de roca y mineral muy finas (de menos de 2 milímetros de diámetro) eyectadas por un viento volcánico.	http://es.wikipedia.org/wiki/Ceniza_volc%C3%A1nica	Volcanic ash		
##	Cenozoico	n.	Griego	καινός (kainós), "nuevo" y el griego antiguo ζῷο-, "animal" y el sufijo -ico.	Ing.	1. . De la cuarta era geológica de las que constituyen la historia de la Tierra, que comprende desde el final del cretácico hasta la época actual, o relacionado con ella.	http://www.wordreference.com/definicion/cenozoico	Cenozoic		
##	Centrífuga	adj.	Latín	Centrum o fugere	Ing.	que centrifuga	Own definition	Centrifugal		
##	Centrífuga	n.	Latín	Centrum o fugere	Mec.	Son aquellas en que el fluido ingresa a ésta por el eje y sale siguiendo una trayectoria periférica por la tangente	http://tarwi.lamolina.edu.pe/~dsa/TBombas.htm	Centrifuge		
##	Ciclamato	n.	Derivado	ciclohexilsulfamato.	Qmc.	ciclohexilsulfamato. Denominado en la industria alimenticia con las siglas E 952. El ciclamato es un edulcorante no calórico descubierto en 1937, que ha sido considerado hasta cincuenta veces más dulce que otros endulzantes bajos en calorías.	http://es.wikipedia.org/wiki/Ciclamato	Cyclamate		
##	Cloruro Cl-	n.	Griego	χλωρός, "verdoso"(khlôros),	Qmc.	Combinación del cloro con un metal, con un metaloide o con un radical orgánico:	http://www.wordreference.com/definicion/cloruro	Chloride		
##	Cobalto Co	n.	Alemán	alemán kobalt, voz derivada de kobold,	Qmc.	s un elemento químico de número atómico 27 y símbolo Co situado en el grupo 9 de la tabla periódica de los elementos.	http://es.wikipedia.org/wiki/Cobalto	Cobalt		
##	Cobertura Vegetal	n.	Latín	coopertūra). vegere =estar vivo	Agr.	Es toda vegetación natural correspondiente a un área o territorio, que incluye principalmente: bosques, matorrales, sabanas, vegetación de agua dulce, terrenos con escasa vegetación y áreas agropecuarias en uso.	http://www.dominicanaonline.org/diccionariomedioambiente/es/definicionVer.asp?id=187	Vegetation Coverage		
##	Cobre Cu	n.	Latín del Griego	latín cŭprum, y éste del griego kýpros),	Qmc.	elemento químico de número atómico 29. Se trata de un metal de transición de color rojizo y brillo metálico que, junto con la plata y el oro, forma parte de la llamada familia del cobre, se caracteriza por ser uno de los mejores conductores de electricidad (el segundo después de la plata).	http://es.wikipedia.org/wiki/Cobre	Copper		
##	Coccidios	n.	Griego	Del griego kokkos, grano, y eidos, forma	Med.	Parásito unicelular de la clase de los esporozoarios, observado particularmente en el hígado del conejo, en donde determina lesiones quísticas o de aspecto	http://www.portalesmedicos.com/diccionario_medico/index.php/Coccidio	Coccidia		

						neoplásico. Algunas observaciones tienden a demostrar que los coccidios se desarrollan igualmente en el hígado del hombre.				
##	Colas	n.	Latín	coda, con el mismo significado, y este del clásico cauda,	Min.	Material resultante de procesos de lixiviación y concentración de minerales que contiene muy poco metal valioso. Pueden ser nuevamente tratadas o desechadas.	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=colas	Tailings	Sin.	Relave, residuos
##	Colector Solar	n.	Latín	collectio, legere latín solāris,	Ing.	Mecanismo o sistema diseñado para absorber las radiaciones solares y transformar esa energía en calor. También llamado colector.	http://www.parro.com.ar/definicion-de-colector+solar	Solar Collector		
##	Coluvio Aluvial	adj.	Latín	alluvĭes, aluvión	Ing.	Dicho de un terreno: de aluvión	www.rae.es	Colluvio Alluvial		
##	Complejos sulfurados	n.	Latín	complexus; sulphur, sulfŭris	Qmc.	Unidad litoestratigráfica compuesta por diversos tipos de roca (sedimentarias, ígneas o metamórficas) y caracterizada por ser una mezcla irregular de litologías o por tener relaciones estructurales altamente complicadas.	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=complejo	Sulphide complexes		
##	Composición Bromatológica	n.	Latín y Griego	compositionem (nom. Compositio del griego bromos, que significa "hedor"	Ing.	La Bromatología es la ciencia que estudia los alimentos más que la alimentación; igualmente se encarga de la conservación y tratamiento en general de los alimentos.	http://www.universidadperu.com/bromatologia-peru.php	Bromatological composition		
##	Compost	n.	Latín	del latín clásico, neutro de compositus, compostus, participio pasado de componere, 'juntar'; formado a su vez a partir de cum, 'con', + ponere, 'poner'.	Qmc.	(a veces también se le llama abono orgánico) es el producto que se obtiene del compostaje, y constituye un "grado medio" de descomposición de la materia orgánica, que ya es en sí un buen abono. Se denomina humus al "grado superior" de descomposición de la materia orgánica. El humus supera al compost en cuanto abono, siendo ambos orgánicos.	http://es.wikipedia.org/wiki/Compost	Compost	Sin.	Compostaje
##	Concentración Centrífuga	n.	Latín del Griego	lat. centrum, y este del gr. κέντρον, aguijón,; Centrum o fugere	Min.	equipos que utilizan la fuerza centrífuga generada por la rotación a alta velocidad del depósito al que se alimenta el mineral en forma de pulpa. Uno de estos equipos es el concentrador Knelson.	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=concentrador	Centrifugal Concentration		
##	Concentración en Mesa	n.	Latín	centrum, y este del gr. κέντρον, aguijón, punta del compás en la que se apoya el trazado de la circunferencia / mensa	Ing.	separacion de dos materiales de diferente densidad al pasar por una suspensión diluida sobre una tabla ligeramente inclinada, teniendo un movimiento horizontal reciproca o sacudiendo con movimientos lentos hacia adelante y un rapido movimiento de retorno	http://www.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=&index=alt&srchtxt=CONCENTRATION%20TABLES	Concentration in table	Syn.	Tabling
##	Concentración Gravimétrica	n.	Latín y Griego	lat. centrum, y este del gr. κέντρον, aguijón,; lat. gravĭtas, -ātis y del griego gr. μέτρον, medida	Min.	Método de concentración que aprovecha la diferencia en el peso específico entre los minerales a separar	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=concentracion	Gravimetric concentration		
##	Concentrador	n.	Latín	lat. centrum, y este del gr. κέντρον, aguijón,;	Min.	parato de la planta de concentración, como las celdas de flotación, jigs, electromagnetos, mesa vibratoria, entre otros.	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=concentrador	Concentrator		
##	Concentrados	n.	Latín	lat. centrum, y este del gr. κέντρον, aguijón,;	Min.	Es el producto enriquecido de las operaciones de concentración de minerales	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=concentrado	Concentrateds		
##	Concepto Win Win Win	n.			Ing.	situacion en la que todos en la accion tienen un resultado favorable	http://www.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=&index=alt&srchtxt=WIN%20WIN%20SITUATION	Win win win concept		

##	Conductividad	n.	Latín	conductus, conducido)	fis.	Propiedad natural de los cuerpos que consiste en transmitir el calor o la electricidad	http://www.wordreference.com/definicion/conductividad	Conductivity		
##	Confluencia	n.	Latín	confluentia (con= convergencia reunion, fluere= fluir, manar	hidr	na confluencia es la reunión en uno solo de dos o más cursos de agua, glaciares, o corrientes marinas, así como el punto donde esto ocurre. Aguas abajo de una confluencia, el lecho del río suele ser más estrecho que la suma de la anchura que tienen los dos ríos aguas arriba. Esa estrechez queda compensada por una mayor profundidad del lecho por el cual la corriente es también más rápida	http://es.wikipedia.org/wiki/Confluencia	Fork	Syn.	Confluence
##	Contingencia	n.	Latín	contingentem	Eco.	una condicion o situacion esxistente que incluye incertidumbre sobre una posible ganancia o perdida individual u organizacional que sera resuelta cuando uno o mas eventos futuros occurran o dejen de ocurrir.	http://www.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=&index=alt&__index=alt&srchtxt=contingencia&comencsrch.x=0&comencsrch.y=0	Contingency		
##	Cooperativa	n.	Latín	lat. Cooperāri	Min.	“una asociación autónoma de personas que se han unido de forma voluntaria para satisfacer sus necesidades y aspiraciones económicas, sociales y culturales en común mediante una empresa de propiedad conjunta y de gestión democrática	www.gerencie.com/cooperativas.html	cooperative		
##	Correa Transportadora	n.	Latín	lat. Corrigĭa / transportare, trans- "across" (+ portare "llevar"	Ing.	ste tipo de transportadoras continuas están constituidas básicamente por una banda sinfín flexible que se desplaza apoyada sobre unos rodillos de giro libre. El desplazamiento de la banda se realiza por la acción de arrastre que le transmite uno de los tambores extremos, generalmente el situado en "cabeza". Todos los componentes y accesorios del conjunto se disponen sobre un bastidor, casi siempre metálico, que les da soporte y cohesión.Se denominan cintas fijas a aquéllas cuyo emplazamiento no puede cambiarse. Las cintas móviles están provistas de ruedas u otros sistemas que permiten su fácil cambio de ubicación; generalmente se construyen con altura regulable, mediante un sistema que permite variar la inclinación de transporte a voluntad.	http://www.proyectosfindecarrera.com/definicion/cinta-transportadora.htm	Transporting Belt	Sin / Syn	Cinta Transportadora / Conveyor Belt
##	Corriente	n.	Latín	at. currens, -entis)	Ing.	flujo de carga por unidad de tiempo que recorre un material. Se debe a un movimiento de los electrones en el interior del material. En el Sistema Internacional de Unidades se expresa en C·s-1 (culombios sobre segundo), unidad que se denomina amperio. Una corriente eléctrica, puesto que se trata de un movimiento de cargas, produce un campo magnético, lo que se aprovecha en el electroimán.	http://es.wikipedia.org/wiki/Corriente_el%C3%A9ctrica	Flow	Sin.	Caudal
##	Cosechadora	n.	Latín	del latín collecta y éste de colligere (recoger, coger)	Ing.	1. Máquina que siega la mies, limpia y envasa el grano.	http://www.wordreference.com/definicion/cosechadora	Harvester		
##	Costo de Inversión	n.	Latín	latín constare /invertĕre	Eco.	los factores técnicos que intervienen en la producción medibles en dinero	http://www.economia.unam.mx/sua/enlinea/sualin/costos/Costos.doc	Investment Cost		
##	Costo directo	n.	Latín	latín constare at. directus, part. pas. de dirigĕre, dirigir	Eco.	Cualquier costo de producción que es directamente identificable en el producto final.	http://es.mimi.hu/economia/costo_directo.html	Direct Cost		
##	Costo Fijo	n.	Latín	latín constare fijo lat figere	Eco.	Costo que no varía ante cambios en el nivel de producción.	http://es.mimi.hu/economia/costo_directo.html	Fixed Cost		

##	Costo indirecto	n.	Latín	latín constare at. directus, part. pas. de dirigĕre, dirigir	Eco.	Gastos por fuerza laboral y gastos imprevistos que son necesarios para realizar negocios, pero que no varían directamente con el volumen de las ventas	http://www.degerencia.com/glosario.php?pid=165	Indirect Cost		
##	Costo Variable	n.	Latín	latín constare lat. variabĭlis).	Eco.	on aquellos que se modifican de acuerdo con el volumen de producción, es decir, si no hay producción no hay costos variables y si se producen muchas unidades el costo variable es alto. Unitariamente el costo variable se considera Fijo, mientras que en forma total se considera variable.	http://www.elprisma.com/apuntes/economia/tiposdecostos/	Variable Cost		
##	Crecimiento demográfico	n.	Latín y Griego	lat. crescĕre) Griego: Demos = Demos = Población o Pueblo. Graphe = Graphe = Descripción o representación.	Arq.	CRECIMIENTO DE POBLACION en un determinado país, región,etc.	http://es.answers.yahoo.com/question/index?qid=20100629162216AAxbEyH	Demographical Growing		
##	Crecimiento Urbano	n.	Latín	lat. crescĕre) / urbānus	Arq.	crecimiento de la mancha urbana o mancha metropolitana de una ciudad, es cuando hay mas nacimientos que defunciones y mucha gente de otras ciudades se va a vivir a esa ciudad, haciendo que la población crezca	http://es.answers.yahoo.com/question/index?qid=20090820171319AAveH2f	Urban Growing		
##	Criptográfico	adj.	Griego	gr. κρυπτός, oculto, y -grafía	Ing.	Perteneciente a la transformación de los datos para ocultar su significado.		Cryptographic Structure		
##	Cristalización	n.	Latín del Griego	cristallus del griego q significa hielo	Qmc.	La cristalización es el proceso por el cual se forma un sólido cristalino, ya sea a partir de un gas, un líquido o una disolución. La cristalización es un proceso en donde los iones, átomos o moléculas que constituyen la red cristalina crean enlaces hasta formar cristales, que se emplea en química con bastante frecuencia para purificar una sustancia sólida.	http://es.wikipedia.org/wiki/Cristalizaci%C3%B3n	Crystallization		
##	Cromo Cr	n.	Griego	khroma, color	Qmc.	El cromo es un elemento químico de número atómico 24 que se encuentra en el grupo 6 de la tabla periódica de los elementos. Su símbolo es Cr. Es un metal que se emplea especialmente en metalurgia.	http://es.wikipedia.org/wiki/Cromo	Chromium		
##	Cuadrante	n.	Latín	quadratus (cuadrado)	geo.	Cuarta parte de la circunferencia o del círculo comprendida entre dos radios perpendiculares:	http://www.wordreference.com/definicion/cuadrante	Quadrants		
##	Cuarcita	n.	Alemán	alemán "Quarz	Qmc.	. Roca metamórfica formada exclusivamente por granos de cuarzo, que suele tener un color blanquecino, es muy dura y se usa en las industrias de la construcción y la cerámica.	http://www.wordreference.com/definicion/cuarcita	Quartzite		
##	Cuarteo	n.	Latín	quadratus (cuadrado)	Ing.	tr. Partir o dividir una cosa en cuartas partes, o en más o menos partes.	http://www.definicion.org/cuartear	Quartering		
##	Cubierta	n.	Latín	coopertus	Ing.	Sistema de cierre en la parte superior de una maquinaria	www.definicion.org/cubierta	Openings	Syn.	Layers
##	Cubierta	n.	Latín	coopertus	Min.	Capa superficial de tierra estéril que recubre el banco de piedra en una cantera o el criadero o yacimiento de una mina.	http://www.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=&index=alt&__index=alt&srchtxt=cubierta&comencsrch.x=0&comencsrch.y=0	Coverage		

##	Cuenca	n.	Latín	lat. concha).	hidr	hoya hidrografica, cuenca de drenaje o cuenca imbrífera al espacio delimitado por la unión de todas las cabeceras que forman el río principal o el territorio drenado por un único sistema de drenaje natural, es decir, que drena sus aguas al mar a través de un único río, o que vierte sus aguas a un único lago endorreico. Una cuenca hidrográfica es delimitada por la línea de las cumbres, también llamada divisoria de aguas. El uso de los recursos naturales se regula administrativamente separando el territorio por cuencas hidrográficas, y con miras al futuro las cuencas hidrográficas se perfilan como las unidades de división funcionales con más coherencia, permitiendo una verdadera integración social y territorial por medio del agua.	http://es.wikipedia.org/wiki/Cuenca_hidrogr%C3%A1fica	Basin		
##	Cuerpo Receptor	n.	Latín	Corpus / receptor, -ōris)	hidr	Es todo cuerpo de agua (río, lago, agua subterránea, mar) susceptible de recibir directa o indirectamente vertidos o descargas de aguas residuales. A los fines de la Ley General Sobre Medio Ambiente y Recursos Naturales, las plantas de tratamiento no se consideran cuerpos receptores, ni de disposición final.	http://www.dominicanaonline.org/diccionariomedioambiente/es/definicionVer.asp?id=240	Receipting body	Syn.	Receiving Body
##	Curva de nivel	n.	Latín	lat. Curvus / prov. Nivel	Topog.	Línea curva que representa los puntos donde la elevación del terreno es la misma sobre un plano o mapa topográfico.	http://www.parro.com.ar/definicion-de-curva+de+nivel	Contour lines		
##	Cuye	n.	Quechua		Zoo.	Es un pequeño mamífero del orden de los roedores originarios de la zona andina del Perú y otros países sud americanos. Tiene el cuerpo compacto y mide entre 20 y 40 centímetros. El pelo de algunas especies es largo y la textura puede ser áspera o suave. El color puede ser blanco, negro o leonado; también los hay de pelaje con rayas o manchas de colores oscuros sobre fondo blanco.	http://www.monografias.com/trabajos76/cuye-cuy/cuye-cuy.shtml	Guinea Pig		
##	Deforestado	adj.	Latín	lat. forestālis).	Ing.	despojado de sus masas forestales	http://www.wordreference.com/definicion/deforestar	Deforested		
##	Degradación de suelos	n.	Latín	gradus =paso, escalon / solum =suelo	geo.	Se entiende la reducción o la pérdida de la productividad biológica o económica y la complejidad de las tierras agrícolas de secano, las tierras de cultivo de regadío, los pastizales, los bosques y las tierras arboladas, ocasionada en zonas áridas, semiáridas y subhúmedas secas, por los sistemas de utilización de la tierra o por un proceso o una combinación de procesos, incluidos los resultantes de actividades humanas y pautas de poblamiento. Ver: degradación; degradación de los suelos.	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=degradacion	Soil Degradation	Syn.	Soil Deterioration, spoilage
##	Delta	n.	Griego	gr. δέλτα	geo.	Geoforma generada por la acumulación de sedimentos de origen aluvial formada cuando una corriente de agua entra al mar. Sus formas variables dependen de la interacción entre el río, las olas y la marea. Los deltas constituyen un complejo de geoformas producto de la interacción de los procesos fluviales y marinos, en los cuales se conjugan principalmente los sedimentos aluviales aportados por los ríos que interactúan con el oleaje y la marea. Las mayores geoformas deltaicas incluyen cordones litorales, marismas, diques aluviales y llanuras de desborde.	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,0/	Delta		

##	Demanda	n.	Latín	atín demandāre	Eco.	a cantidad y calidad de bienes y servicios que pueden ser adquiridos a los diferentes precios del mercado por un consumidor (demanda individual) o por el conjunto de consumidores (demanda total o de mercado), en un momento determinado.	http://es.wikipedia.org/wiki/Demanda_%28econom%C3%ADa%29	Demand		
##	Densidad Aparente	n.	Latín	densus).	Ing.	. Peso (W) de un objeto o material dividido por su volumen exterior (Ve) menos el volumen de sus poros abiertos (Vp). Densidad aparente = W/(Ve - Vp). 2. En carbones, se refiere al ensayo que consiste en la determinación de la masa de agua desplazada por una cantidad conocida de trozos (polvo) de carbón seco, por peso de carbón seco y húmedo.	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,0/	Apparent Density		
##	Densidad de Corriente	n.	Latín	densus). / at. currens, -entis)	Ing.	La densidad de corriente eléctrica se define como una magnitud vectorial que tiene unidades de corriente eléctrica por unidad de superficie ,es decir, intensidad por unidad de área. Matemáticamente, la corriente y la densidad de corriente se relacionan como :	http://es.wikipedia.org/wiki/Densidad_de_corriente	Current Density		
##	Densidad Real	n.	Latín	densus).	Ing.	. Densidad de una partícula, calculada dividiendo su masa (m) por su volumen (v) excluyendo sus poros. 2. En carbones, se refiere al ensayo que permite determinar la masa de agua desplazada por una cantidad conocida de carbón seco, previamente pulverizado.	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,0/	Absolute Density	Syn.	Bulk Density
##	Denso (herbazal)	adj.	Latín	densus).	Agr.	Espeso, apiñado o engrosado:	http://www.wordreference.com/definicion/denso	thick		
##	Denudacional	adj.	Latín	denudatĭo, -ōnis).	Ing.	La suma de los procesos que dan como resultado el desgaste o la progresiva disminución de la superficie de la corteza terrestre por la acción de varios agentes naturales, los cuales incluyen meteorización, erosión, remoción en masa y transporte; también los efectos combinados destructivos de estos procesos. El término denudación es más amplio en su alcance que erosión, aunque comúnmente son usados como sinónimos. También es usado como sinónimo de degradación, aunque algunas autoridades toman "denudación" como los procesos reales y "degradación" como los resultados producidos. 2. Estrictamente es el destape, el descubrimiento o la exposición de la roca o de una formación de roca determinada por medio de remover el material sobrepuesto por erosión. Este es el significado original y etimológicamente correcto del término denudación, el cual a menudo fue aplicado en un sentido catastrófico, por ejemplo, la "Gran Denudación" resultante del diluvio universal.	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,0/	Denudational		
##	Depósito Coluvial	n.	Latín	deposītum /pluvĭa)	geo.	Suelo formado al pie de una montaña o ladera producto del desprendimiento o arrastre de material de la montaña o ladera.	http://www.bvsde.ops-oms.org/bvsade/fulltext/vulnera/anexob.pdf	Coluvial Deposit		
##	Depósito Fluvioglaciar	n.	Latín y Francés	deposītum /pluvĭa)- FR: glacier	geo.	depósito causado por las aguas corrientes provenientes de la fusión de glaciares	http://es.wikipedia.org/wiki/Fluvioglaciar	Fluvioglacial deposit		
##	Depreciación	n.	Latín	at. pretĭum).	Eco.	isminución del precio de algo en comparación con el que tenía antes o cotejándolo con otros de su clase.	http://www.definicion.org/depreciacion	Depreciation		

##	Dermatitis	n.	Griego	δέρ-μα/-ματος gr. 'piel'	Med.	Inflamación de la piel. La dermatitis usualmente se caracteriza por la rojedad, inflamación, formación de ampollas, exudación y casi siempre el comezón. El término eczema , antiguamente referido como ampolladuras, estado de exudación de piel inflamada, ha pasado por uso común a tener el mismo significado que dermatitis.	http://diccionario.babylon.com/dermatitis/	Dermatitis		
##	Descarga	n.	Latín	carricāre, y este del lat. carrus, carro	hidr	Es el volumen de agua que pasa a un determinado lugar en un determinado periodo de tiempo. Usualmente expresado en pies cúbicos por segundo o metros cúbicos por segundo. Glosario Hidrogeológico.	www.ingeominas.gov.co/component/.../limitstart,45/	Discharge		
##	Descomposición Anaeróbica	n.	Latín y Griego	compositĭo, -ōnis) /gr. ἄερο- gr. βιο-	Qmc.	Es la descomposición incompleta de la materia orgánica por las bacterias, en ausencia de oxígeno.	http://ciencia.glosario.net/medio-ambiente-acuatico/anaer%F3bica-descomposici%F3n-10243.html	Anaerobic decomposition		
##	Desecho	n.	Latín	disiectāre)	Min.	Denominación genérica de cualquier tipo de productos residuales o basuras procedentes de la actividades humanas o bien producto que no cumple especificaciones.	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,50/	Waste		
##	Desembocadura	n.	Latín	at. bucca, voz de or. celta; cf. galo boc[c]a)	geo.	. Lugar por donde una corriente de agua desemboca en otra:	http://www.wordreference.com/definicion/desembocadura	Mouth		
##	Desembocar	v.	Latín	at. bucca, voz de or. celta; cf. galo boc[c]a)	geo.	Desaguar una corriente de agua en otra mayor:	http://www.wordreference.com/definicion/desembocar	Flow		
##	Desertificación	n.	Latín	desertus que significa olvidado el cual proviene del verbo deserere, que significa olvidar o abandonar	geo.	Degradación de las tierras secas provocada por diversos factores, como las variaciones climáticas y la actividad del hombre.	http://www.greenfacts.org/es/glosario/def/desertificacion.htm	Desertification		
##	Deslizamiento	n.	Raíz Onomatopéica	raíz onomat. liz)	Ing.	Movimientos hacia afuera o cuesta abajo de materiales que forman laderas (rocas naturales y tierra). Son desencadenados por lluvias torrenciales, la erosión de los suelos y temblores de tierra, pudiendo producirse también en zonas cubiertas por grandes cantidades de nieve (avalanchas).	http://arte-y-arquitectura.glosario.net/construccion-y-arquitectura/deslizamiento-de-tierra-6899.html	Landslide		
##	Desmonte	n.	Francés	Monter	Min.	Mineral de desecho amontonado en la boca de una mina.	http://www.wordreference.com/definicion/desmonte	Mining Wastes		
##	Desodoración	n.	Latín	odor	Ing.	control de olores	http://spines.r020.com.ar/index.php?tema=5954&/desodoracion	Deodorising		
##	Desparacitación	n.	Griego	parasitus	Zoo.	eliminacion de parasitos	http://www.wordreference.com/definicion/desparasitar	Antiparasite		
##	Detoxificación	n.	Latín	toxĭcum, tósigo	Ing.	Neutralización del poder tóxico de ciertos cuerpos por su combinación con otras sustancias:	http://cvc.cervantes.es/foros/leer_asunto1.asp?vCodigo=36660	Detoxification		
##	Detritos	n.	Latín	detrītus, desgastado).	Qmc.	Fragmento de un cristal, de una roca, de un fósil o de otro material que conforma depósitos o rocas sedimentarias detríticas.	http://www.ingeominas.gov.co/index.php?option=com_glossary&catid=82&func=display&search=clasto	Detritus		
##	devonico		Epónimo	De Devonshire, condado inglés con rocas de este período	geo.	Cuarto período de la Era Paleozoica, que se extiende desde 410 hasta hace 355 millones años. Las formas de vida animal predominantes en este periodo fueron varios tipos de peces, que abarcaban tiburones, dipnoos, peces acorazados y una forma primitiva de peces ganoideos (con escamas duras), de los cuales evolucionaron probablemente los ancestros de los anfibios. Algunos restos fósiles	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,50/	Devonian		

						encontrados en Pensilvania y Groenlandia indican que los primeros anfibios existían ya en este período. También había corales, estrellas de mar, esponjas y trilobites. El primer insecto conocido se ha encontrado en rocas devónicas.				
##	Diesel	n.	Epónimo	Rudolf Diesel	Qmc.	Diesel es producido de petróleo y es parecido al gasóleo calefacción. Al contrario de combustibles para motores de gasolina, diesel está usado en así llamados motores de encendido automático. Es decir, el cumbustible no es encendido por una chispa, sino se enciende de sí por el acaloramiento en estar comprimido por el pistón, andando arriba. Aparte de eso, diesel no está carburado, sino por los inyectores del motor diesel está inyectado entre el cilindro, y con eso atomizado. Usando gasóleo calefacción en un motor diesel moderno, que en muchos países también es ilegal, en poco tiempo lleva a la destrucción del sistema de control de escape, ya que el gasóleo calefacción contiene una cantidad de azufre mucho más alta.	http://www.sured.info/defe/diesel.html	Diesel		
##	Digestiva	adj.	Latín	digestĭo, -ōnis	Bio.	[Operación o parte del organismo] que participa en la digestión:	http://www.wordreference.com/definicion/digestivo	Digestive		
##	Dimensionado	adj.	Latín	dimensĭo, -ōnis	Ing.	Establecer las dimensiones exactas de algo	http://www.wordreference.com/definicion/dimensionar	Dimensioned	Syn.	Sized
##	Dimensionamiento	n.	Latín	dimensĭo, -ōnis	Ing.	Accion y efecto de dimensionar	www.rae.es	Sizing		
##	Dinámica	adj.	Griego	δυναμικός, "potente"	Ing.	erteneciente o relativo a la fuerza cuando produce movimiento; de la parte de la mecánica que trata de las leyes del movimiento en relación con las fuerzas que lo producen; del sistema de fuerzas dirigidas a un fin; y del nivel de intensidad de una actividad.	http://definicion.de/dinamica/	Dynamic		
##	Directriz	n.	Latín	directiōnis,	Ing.	1. [Línea, superficie o volumen] que determina las condiciones de generación de otra línea, superficie o volumen. También adj.	http://www.wordreference.com/definicion/directriz	Guideline		
##	Disuelto	adj.	Latín	dissolvĕre	Min.	Desunido, separar las partículas o moléculas de un cuerpo sólido o espeso por medio de un líquido, hasta lograr una mezcla homogénea. También prnl.:	http://www.wordreference.com/definicion/disuelto	Dissolved		
##	Diurética	adj.	Griego	| οὖρον | orina	Bio.	Que tiene virtud para aumentar la secreción y eliminación de orina:	http://www.wordreference.com/definicion/diur%C3%A9tico	Diuretic		
##	Draga	n.	Inglés	ingl. drag, rastra	Min.	Embarcación destinada a la extracción de barros marinos y fluviales. Tipos: draga de cortador, draga de cuchara o Priestman, draga excavadora, draga de rosario o cangilones y draga de succión con o sin cúter.	http://www.gencat.cat/treball/departament/centre_documentacio/publicacions/seguretat_salut_laboral/guies/llibres/construccio_accessible/esp/04/04_18.pdf	Dredge		
##	Dragado	n.	Inglés	ingl. drag, rastra	Min.	Extracción de arena, piedras y otros materiales del fondo de un río, puerto o cualquier zona navegable:	http://www.wordreference.com/definicion/dragado	Dredging		
##	Drenaje	n.	Inglés	ngl. drainage)	Min.	Conjunto de los cursos de agua que aseguran la recolección de las aguas de una misma cuenca hidrográfica, y en este caso se hable de red, de sistema o patrón de drenaje	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,150/	Drainage		
##	Drenaje Ácido	n.	Inglés y Latín	ngl. drainage) lat acidus	Min.	n DAM es un agua de pH bajo, enriquecida en sulfatos y con grandes concentraciones de acidez. La acidez de los DAM es producida por oxidación e	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/lett	Acid Drainage		

						hidrólisis de minerales de sulfuros y está representada por acidez mineral (hierro, aluminio, manganeso y otros metales, dependiendo de la geología del depósito) y acidez de ion hidrógeno	er,D/Itemid,99999999/catid,82/limit,50/limitstart,150/			
##	Dureza	n.	Latín	durus	Ing.	Resistencia que ofrece un material a ser rayado. Actualmente se mide por la resistencia que opone a la penetración de una punta de diamante. 2. Resistencia de un mineral a la destrucción mecánica de su estructura; en la práctica, se dice que un mineral es más duro que otro si raya a este último. Esta resistencia depende de la dirección por la que discurra la raya, ya que es una propiedad muy relacionada con la estructura. Generalmente los minerales presentan un intervalo de dureza que incluye todas las posibilidades en cuanto a la orientación de la raya. Las durezas están clasificadas con respecto a las propias de 10 minerales patrones o escala de Mohs, existen otras escalas de dureza usadas en metalografía y en otras áreas, pero que raramente se emplean en mineralogía (Vickers, Rosiwal, Knoop, Brinell, Rockwell). Para realizar la medida de dureza se utiliza un dispositivo denominado esclerómetro. La dureza es una propiedad importante cuando se trata de piedras preciosas (gemas), puesto que una de las características que han de poseer las gemas, es la de mostrar una dureza mayor o igual que 7, en la Escala de Mohs	http://www.ingeominas.gov.co/component/option,com_glossary/func,display/letter,D/Itemid,99999999/catid,82/limit,50/limitstart,150/	Hardness		
##	Eczema	n.	Griego	ἔκζεμα, erupción cutánea	Med.	rastorno cutáneo caracterizado por comezón, descamación, engrosamiento de la piel; usualmente se localiza en la cara, los codos, las rodillas y los brazos	http://es.mimi.hu/medicina/eczema.html	Eczema		
##	Edáfico	adj.	Griego	ἔδαφος, "suelo	Ing.	Del suelo o relativo a él, especialmente en lo que se refiere a las plantas.	http://www.wordreference.com/definicion/ed%C3%A1fico	Edaphic	Syn.	Edapholo gic
##	Edulcorante	n.	Latín	lat. edulcorāre)	Agr.	Sustancia que sirve para endulzar alimentos y medicamentos. Los edulcorantes pueden ser sustancias naturales (azúcar, miel de abejas, etc) o sintéticas (sacarina).	http://ciencia.glosario.net/agricultura/edulcorante-11110.html	Sugar substitute		
##	Efluente	n.	Latín	effluĕre	Ing.	La salida o flujos salientes de cualquier sistema que despacha flujos de agua, a un tanque de oxidación, a un tanque para un proceso de depuración biológica del agua, etc. Este es el agua producto dada por el sistema.	http://www.definicion.org/efluente	Effluent		
##	Egreso	n.	Latín	egresus	Eco.	salida de dinero desde las cajas de una empresa o de una organización	http://www.definicionabc.com/economia/egresos.php	Outcome		
##	Electrólisis	n.	Latín del Griego	electrum, y este del gr. ἤλεκτρον, ámbar	Ing.	Procedimiento de descomposición de los elementos que forman un compuesto mediante la aplicación de una corriente eléctrica; con este método se produce primero la descomposición en iones, seguido de efectos diversos o reacciones secundarias según cada caso.	http://www.construmatica.com/construpedia/Electr%C3%B3lisis	Electrolysis		
##	Embalse	n.	Griego	endo- y el gr. παράσιτος)	Ing.	Depósito artificial en el que se almacenan las aguas de un río o de un arroyo, generalmente mediante una presa o un dique que cierra la boca de un valle:	http://www.wordreference.com/definicion/embalse	Dam		

##	Émbolo	n.	Latín del Griego	embolus y este del griego ἔμβολο	Mec.	especie de émbolo que va ajustado al interior de las paredes del cilindro gracias a una serie de aros de características flexibles a los que llamamos segmentos.	http://www.definicionabc.com/motor/piston.php	Piston		Pistón
##	Enclave Cultural	n.	Latín	inclavare / cultūra	Otr.	un espacio o lugar que tiene limites culturales	Own definition	Cultural Enclave		
##	Endoparásito	n.	Griego	endo- 'dentro', 'en el interior y el gr. παράσιτος)	Bio.	[Parásito] que se aloja dentro del cuerpo de un animal o dentro de una planta:	http://www.wordreference.com/definicion/endopar%C3%A1sito	Endoparasitoid		
##	Endorreica	adj.	Griego	endo, "interior" y rhein, "fluir"	geo.	área en la que el agua no tiene salida fluvial hacia el mar	http://es.wikipedia.org/wiki/Cuenca_endorreica	Endorheic		
##	Energía Geotérmica	n.	Griego	Latín energīa y del Griego ενέργεια (acción, trabajo) θερμο-) caliente	Ing.	es un tipo de energía renovable que está íntimamente relacionada con géiseres, volcanes, aguas termales, entre otras cosas. Las zonas que poseen actividad o que tuvieron actividad durante los últimos 10 años en la corteza terrestre son también capaces de proveer energía geotérmica. Pero luego de haber definido este tipo de energía, lo curioso, al menos para muchos individuos, es saber cómo se extra y se utiliza este tipo de energía.	http://www.abcpedia.com/cienciaytecnologia/energia/geotermica.html	Geothermal Energy		
##	Energía Solar	n.	Latín del Griego	Latín energīa y del Griego ενέργεια (acción, trabajo/latín sol	Ing.	un tipo de energía renovable y confiable; renovable quiere decir "inagotable". La característica principal de la energía solar es justamente este adjetivo, el poder ser utilizada una y otra vez sin temer a que se agote; la definición de energía solar afirma que la misma puede ser obtenida a través de un "combustible de libre acceso": la radiación solar.	http://www.instalacionenergiasolar.com/energia/defincionenergiasolar.html	Solar Energy		
##	Energía Térmica	n.	Griego	Latín energīa y del Griego ενέργεια (acción, trabajo) θερμο-) caliente	Ing.	Se denomina energía térmica a la energía liberada en forma de calor. Puede ser obtenida de la naturaleza o del sol, mediante una reacción exotérmica, como la combustión de algún combustible; por una reacción nuclear de fisión o de fusión; mediante energía eléctrica por efecto Joule o por efecto termoeléctrico; o por rozamiento, como residuo de otros procesos mecánicos o químicos. Asimismo, es posible aprovechar energía de la naturaleza que se encuentra en forma de energía térmica, como la energía geotérmica o la energía solar fotovoltaica.	http://es.wikipedia.org/wiki/Energ%C3%ADa_t%C3%A9rmica	Thermal Energy	Syn.	Electric Powder
##	Enmaderación	n.	Latín	materia	Min.	Construir el entramado de vigas y maderas de un edificio	http://www.definicion.org/diccionario/55	Timbering		
##	Enraizamiento	n.	Latín	radix, -īcis	Agr.	Acción y efecto de echar raíces una planta, un tallo o un esqueje.	http://es.mimi.hu/jardineria/enraizamiento.html	Rooting	Sin / Syn	Prendimiento / Taking root process
##	Entumecimiento	n.	Latín	lat. intumescĕre, hincharse	Bio.	Impedir, entorpecer el movimiento o acción de un miembro o nervio	www.rae.es	Numbness		
##	Equipo	n.	Francés	équiper, y este del nórd. skipa, equipar un barco, de skip, barco	Ing.	Colección de utensilios, instrumentos y aparatos especiales para un fin determinado	www.rae.es	Equipment		
##	Erosión de Suelos	n.	Latín	erosĭo, -ōnis, roedura / solum (sōlum), "piso", tierra, territorio.	Ing.	proceso de sustracción o desgaste del relieve del suelo intacto (roca madre), por acción de procesos geológicos exógenos como las corrientes superficiales de agua	http://es.wikipedia.org/wiki/Erosi%C3%B3n	Soil Erosion		

						o hielo glaciar, el viento o la acción de los seres vivos. La erosión se refiere al transporte de granos y no a la disgregación de las rocas.				
##	Erosión Eólica	n.	Latín	erosĭo, -ōnis, roedura /Aeolĭcus, y este der. de Aeŏlus, Eolo, dios de los vientos y padre del pueblo cólico en la mitología clásica	Ing.	La erosión eólica es el desgaste de las rocas o la remoción del suelo debido a la acción del viento. El viento es un agente de modelado del relieve que puede acarrear grandes cantidades de polvo a través del mundo, pero los granos de arena solo pueden ser transportados a distancias relativamente cortas	http://es.wikipedia.org/wiki/Erosi%C3%B3n_e%C3%B3lica	Wind Erosion		
##	Erosión Fluvial	n.	Latín	erosĭo, -ōnis, roedura/ fluviālis	Ing.	Las aguas fluviales constituyen un agente erosivo de primera magnitud. Las aguas continentales fluyen, en gran parte, en forma de ríos que discurren sobre la superficie, o de corrientes subterráneas, desgastando los materiales que hay por donde pasan y arrastrando los restos o sedimentos en dirección hacia las partes más bajas del relieve, dejándolos depositados en diversos lugares, formando terrazas, conos de deyección y, en definitiva, modelando el paisaje.	http://es.wikipedia.org/wiki/Erosi%C3%B3n_fluvial	Fluvial Erosion		
##	Erosión Hídrica	n.	Latín y Griego	erosĭo, -ōnis, roedura/ ὕδωρ e –ico)	Ing.	La erosión hídrica es el proceso de sustracción de masa sólida al suelo o a la roca de la superficie llevado a cabo por un flujo de agua que circula por la misma.	http://es.wikipedia.org/wiki/Erosi%C3%B3n_h%C3%ADdrica	Water Erosion		
##	Escarpada	adj.	Latín	scalpellum	Ing.	uy empinado, abrupto y escabroso. Pendiente más corta y abrupta de una cuesta. La pendiente de escarpe indica la dirección contraria al buzamiento.	http://www.alegsa.com.ar/Definicion/de/escarpado.php	Steep	Syn.	Craggy
##	Escarpe	adj.	Latín	scalpellum	Ing.	Declive áspero de cualquier terreno, Entre estratos no perturbados o solo levemente inclinados, el escalón que forma la capa dura que queda sobresaliente entre otras más blandas forma un escarpe.	http://www.estrucplan.com.ar/producciones/entrega.asp?identrega=1650	Escarp		
##	Escombreras	n.	Latín	*excomborāre	Min.	Sitio donde se echan los escombros.	http://www.wordreference.com/definicion/escombrera	Waste Heaps		
##	Escorrentía	n.	Latín	currens, -entis	hidr	Corriente de agua que rebosa su depósito o cauce natural o artificial.	http://www.wordreference.com/definicion/escorrent%C3%ADa	Runoff		
##	Escurrimiento	n.	Latín	currens, -entis	Ing.	parte de la precipitación que aparece en las corrientes fluviales superficiales, perennes, intermitentes o efímeras, y que regresa al mar o a los cuerpos de agua interiores.	http://www.igeograf.unam.mx/instituto/publicaciones/libros/hidrogeografia/cp5.pdf	Runoff		
##	Espejos Parabólicos Lineares	n.	Latín	lat. specŭlum /lat. parabŏla, y este del gr. Παραβολή/ linĕa).	Ing.	Un espejo parabólico tiene la particularidad de que todos los rayos que llegan paralelos al eje óptico se reflejan pasando por el foco. Esta característica se aprovecha por ejemplo en la construcción de antenas parabólicas, hornos solares, etc	http://centros5.pntic.mec.es/ies.victoria.kent/Rincon-C/Curiosid/rc-83/rc-83.html	Linear Parabolic Mirrors		
##	Espuma	n.	Latín	spuma	Qmc.	Conjunto de burbujas que se forman en la superficie de los líquidos:	http://www.wordreference.com/definicion/espuma	Froth		
##	Esquiladora	n.	Gótico	ant. esquirar, este del gót. tardío *skiran, y este de *skaíran; cf. ingl. ant. y a. al. ant. Scëran	Agr.	Que esquila o sirve para esquilar	http://www.wordreference.com/definicion/Que	Clipper		
##	Estática	adj.	Griego	στατική [έπιστήμη]	Mec.	parte de la mecánica que se ocupa del estudio y como llegar al equilibrio de las fuerzas en oportunidad de un cuerpo en reposo. Por esta cuestión es que la estática resulta ser una materia indispensable en carreras y trabajos como los que llevan a	http://www.definicionabc.com/general/estatica.php	Static		

						cabo la ingeniería estructural, mecánica y de construcción, ya que siempre que se quiera construir una estructura fija, como ser, un edificio, en términos un poco más extendidos, los pilares de un rascacielos, o la viga de un puente, será necesario e indiscutible su participación y estudio para garantizar la seguridad de aquellos que luego transiten por las mencionadas estructuras.				
##	Esterificación	n.	Latín	storea, a su vez de sternere, del protoindoeuropeo *str-	Ing.	e denomina esterificación al proceso por el cual se sintetiza un éster. Un éster es un compuesto derivado formalmente de la reacción química entre un oxácido y un alcohol.	http://www.babylon.com/definition/esterificaci%C3%B3n/Spanish	Esterification		
##	Estrato	n.	Latín	stratus	Geol.	cada una de las capas en que pueden dividirse las rocas debido al proceso de sedimentación. Los estratos aparecen como capas horizontales de espesor más o menos uniforme, con interfases nítidos en comparación al estrato más joven que se sitúa encima y al estrato más antiguo que se encuentra debajo. La capa más vieja se conoce como base o muro, mientras que la más joven recibe el nombre de techo.	http://definicion.de/estrato/	Strata		
##	Estroncio Sr	n.	Inglés	strontian, y este de Strontian, pueblo de Escocia donde se encontró este mineral	Qmc.	El estroncio es un metal blando de color plateado brillante, algo maleable, que rápidamente se oxida en presencia de aire adquiriendo un tono amarillento por la formación de óxido, por lo que debe conservarse sumergido en queroseno. Debido a su elevada reactividad el metal se encuentra en la naturaleza combinado con otros elementos y compuestos. Reacciona rápidamente con el agua liberando el hidrógeno para formar el hidróxido	http://es.wikipedia.org/wiki/Estroncio	Strontium		
##	Estructural	adj.	Latín	structura	Ing.	viene (del latín structūra) es la disposición y orden de las partes dentro de un todo. También puede entenderse como un sistema de conceptos coherentes enlazados, cuyo objetivo es precisar la esencia del objeto de estudio. Tanto la realidad como el lenguaje tienen estructura. Uno de los objetivos de la semántica y de la ciencia consiste en que la estructura del lenguaje refleje fielmente la estructura de la realidad	es.wikipedia.org/wiki/Estructura	Structural		
##	Etológica	adj.	Griego y Latín	ἦθος, "costumbre" y -λογία, "tratado	Ing.	De la etología o relativo a esta ciencia:	www.wordreference.com/definicion/etológico	Ethological		
##	Eutrofización	n.	Griego	gr. Εὐτροφία	Ing.	Proceso natural en ecosistemas acuáticos, especialmente en lagos, caracterizado por un aumento en la concentración de nutrientes como nitratos y fosfatos, con los consiguientes cambios en la composición de la comunidad de seres vivos. Las aguas eutróficas en contraste con las oligotróficas son más productivas. Sin embargo, más allá de ciertos límites, el proceso reviste características negativas al aparecer grandes cantidades de materia orgánica cuya descomposición microbiana ocasiona un descenso en los niveles de oxígeno. La eutrofización se produce en muchas masas de agua como resultado de los vertidos agrícolas, urbanos e industriales.	http://www.greenfacts.org/es/glosario/def/eutrofizacion.htm	Eutrofization		

##	Evaluación de Impacto Ambiental	n.	Francés y Latín	fr. évaluer/lat: impactus/lat: ambĭens, -entis, que rodea o cerca	Ing.	Procedimiento administrativo que sirve para identificar, prevenir e interpretar los impactos ambientales que producirá un proyecto en su entorno en caso de ser ejecutado, todo ello con el fin de que la administración competente pueda aceptarlo, rechazarlo o modificarlo.	es.wikipedia.org/wiki/Evaluación_de_impacto_ambiental	Environmental impact Assessment		
##	Evaporación	n.	Latín	evaporatío, -ōnis	Ing.	Transformación de un líquido en vapor o gas:	http://www.wordreference.com/definicion/evaporaci%C3%B3n	Evaporation		
##	Evapotranspiración	n.	Latín	evaporatío, -ōnis /spirāre, exhalar, brotar	Ing.	Se define la evapotranspiración como la pérdida de humedad de una superficie por evaporación directa junto con la pérdida de agua por transpiración de la vegetación. Se expresa en mm por unidad de tiempo.	http://es.wikipedia.org/wiki/Evapotranspiraci%C3%B3n	Evapotranspiration		
##	Excedentes	n.	Latín	excedĕre	Eco.	Beneficio empresarial	www.rae.es	Surpluses		
##	Explotación	n.	Francés	exploiter, sacar provecho	Min.	Se denomina explotación al acto de obtener beneficio de algo o alguien. Más allá de las diversas variantes de sentido que el término reviste, lo cierto es que generalmente se encuentra relacionado al plano social y económico, en la medida en que se relaciona con la noción de valor, al modo en que este se obtiene o se pierde.	http://www.definicionabc.com/economia/explotacion.php	Exploitation		
##	Explotar	v.	Francés	exploiter, sacar provecho	Min.	Sacar utilidad y beneficio de algo:	http://www.wordreference.com/definicion/explotar	Exploit		
##	Factorial	n.	Latín	regŭla / factor, -ōris	Ing.	Producto de los factores, calculado al multiplicar entre sí todos los enteros del 1 a un número específico. Se usa el signo de admiración (!).	http://www.termiumplus.gc.ca/tpv2alpha/alpha-eng.html?lang=eng&i=&index=alt&__index=alt&srchtxt=factorial&comencsrch.x=0&comencsrch.y=0	Factorial		
##	Faldas (cerro)	n.	Francés	falda, pliegue; cf. a. al. ant. faldan, plegar)	Min.	Zona de pendiente suave en la base de un macizo montañoso, correspondiente a la acumulación detrítica.		Foothills		
##	Fase Andino II	n.	Griego y Latín	φάσις, manifestación /Andīnus	Ing.	(plegamiento pliocénico	www.ifeanet.org/publicaciones/boletines/4(3-4)/173.pdf	Andean Phase		
##	Fauna	n.	Latín	Fauna, diosa de la fecundidad	Agr.	Conjunto de animales que viven en una zona o región determinada. La fauna se divide en dos grandes grupos: los invertebrados (que son la forma más antigua y primitiva de vida anormal) y los vertebrados, que se subdividen en peces, anfibios, reptiles, aves, mamíferos.	http://ciencia.glosario.net/agricultura/fauna-11213.html	Fauna	Syn.	wildlife
##	Fenológica	adj.	Griego	gr. φαίνειν, mostrar, aparecer, y -logía	Mete.	Parte de la meteorología que investiga las variaciones atmosféricas en su relación con la vida de animales y plantas	www.diccionariosdigitales.net/.../ciencias%20meteorologica...	Phenologic		
##	Fibra	n.	Latín	fibra	Qmc.	. Cada uno de los filamentos que entran en la composición de los tejidos orgánicos vegetales o animales, de ciertos minerales y de algunos productos químicos:	http://www.wordreference.com/definicion/fibra	Fibre		
##	Filón	n.	Francés	filon	geol.	Masa mineral que llena una grieta de una formación mineral o rocosa más antigua y que puede ser objeto de explotación	http://es.thefreedictionary.com/fil%C3%B3n	Vein		
##	Filtro Anaeróbico	n.	Latín	lat. philtrum, y este del gr. Φίλτρον/gr. άερο-gr. βιο-	Ing.	es una forma de digestor anaerobio. El tanque de la digestión contiene un medio del filtro que las poblaciones bacterianas anaerobias puedan establecer sobre. Los filtros anaerobios se emplean comúnmente en el tratamiento de las aguas inútiles.	http://www.worldlingo.com/ma/enwiki/es/Anaerobic_filter	Anaerobic Filter		

						Los reactores del AF están ganando en renombre contra sistemas de tratamiento de aguas inútiles aerobios establecidos mientras que producen menos residuo sólido[1].				
##	Financiamiento a Fondo Perdido	n.	Francés	fr. Finance	Eco.	es aquel en el cual no se presentará el reembolso del monto financiado.	http://www.fidetel.gob.ve/index.php?option=com_docman&task=d...	Non Recoverable Fund Financing		
##	Fisiografía	n.	Griego	fisio- gr. Φυσιο/ -grafía gr. -γραφία, de la raíz de γράφειν, escribir	geo.	Interpretación de la geografía desde un análisis fisiografico del terreno	http://search.conduit.com/ResultsExt.aspx?ctid=CT2431232&SearchSource=3&q=definicion+%22fisiografia%22	Physiogeography		

ANNEX 5

TERMINOLOGY