

Indigenous People and Climate Change: Causes of Flooding in the Bolivian Amazon and Consequences for the Indigenous Population

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Introduction

This chapter addresses the causes and consequences of climate change among an indigenous population. The effects of climate change on the indigenous people of Beni leading to the historical flooding that occurred there in 2014 was devastating, to the chapter focuses on the effects of the rains on Beni, as this is one of the places that suffer 'monsoon-like' attacks every year. These attacks result in frequent rains and main rivers breaking their banks, resulting in extreme flooding. While this area is characterised by frequent flooding, recent reports indicate that the growth of the rivers in 2014 was higher than those recorded in 2007 and 2008, years in which the effects of La Niña were present. This leads to increased loss of life and property for indigenous and peasant families in the region. On 4 February 2014, a hydrological red alert was declared for the Mamore basin affecting several municipalities in Beni. In this community alone there would have been 3,957 affected families, in addition to a 140-acre loss of crop and 218 families left homeless by the flooding.¹

The main causes of flooding are climate change, deforestation and the overflow of the Brazilian dams, Jirao and San Antonio. Deforestation is one of the causes of excessive rains. Beni is one of the areas where livestock farming is the most important activity, which goes hand-in-hand with the cutting down of trees to enable grazing. Livestock is managed by private corporate cattle ranchers. However the harshest consequences are suffered by the indigenous people, who live on hunting and subsistence farming.

This chapter examines the effect of climate change on the indigenous people from an anthropological perspective. It analyses how land tenure and management in the area fall under two different main activities, livestock farming and agriculture, and how they are developed by two different social groups, namely, cattle ranchers and indigenous people. These activities point to the existence of two different social groups in the community as well as to their different occupations within the same geographical space. For cattle ranchers, the land is there to take advantage of for the purpose of developing their economic potential in the market, so deforestation and *chaqueo*² are common practices in order to rear livestock. Meanwhile, for the indigenous people, preservation of the territory has a more intrinsic worth and a broad understanding of this allows for their subsistence and the development of their community life, as well as managing resources collectively. Thus, these two groups are in constant conflict over land tenure and land ownership rights.

The magnitude of the last flooding occurrence compels a reflection on the implications of the management of the natural resources of this locality. Deforestation (as a more localised cause) and the increase in global temperature (as a more general cause) make it imperative to discuss climate change and its impact on the most vulnerable populations such as the indigenous one under consideration. The Bolivian Amazon, and specifically Beni, is an area of my own interest where I conducted my research, and where floodings have occurred rather frequently. This leads to the conclusion that Beni is one of the places where the indigenous population lives precariously, and where they are set to live through the consequences of climate change.

It is important to consider the overall context of climate change and its effect with indigenous people. Afterwards we will give an overview of Beni, highlighting the development of the economic activities of the farmers and the indigenous population and the implications of their operations on the land. Finally, the chapter examines the causes and consequences of the flooding and their impacts on the indigenous population. The methodology chosen is based on the well-considered view of:

Studying and grasping the processes of disaster on a larger scale, but at the same time, identifying them with the contextual conditions and the specific threat, its manifestations, its effects, and impacts. Far from trying to get an overview, we address the specificity of the process of disaster risk and vulnerability, to which we have referred the process of disaster with a surname, the risk surname, and the vulnerability surname (García 2004)

Climate Change and the Indigenous People

It is well known that the earth's climate is changing radically from previous periods in history, and that the climate change is, in part, occurring due to the influence of human activity. According to the IPCC the global average surface

temperature of the Earth has risen from 0.56 to 0.92 C during the twentieth century (Gallardo 2012: 21). And on average global temperatures will rise by between 1.1 and 6.4 C by the end of the twenty-first century (IPCC 2000; Mario Baudoin 2012:5).

Baudoin states that climate change is the product of global warming and will have significant social and economic impacts, especially in developing countries. It will produce significant changes in the frequency and intensity of extreme events such as heat waves, droughts, and floodings (2012: 1).

Facing the natural risks that could arise from climate change is a challenge for developing countries. In these countries, extreme climatic events tend to prolong development in the long-term because large amounts of money that could be aimed at improving the quality of life are invested in assisting the population and reconstruction after disasters (Baudoin 2012: 5). Even if this is not the only cause of the failure of poverty reduction programmes, risks and disasters affect the results of these programmes (IPCC 2001). Climate change will have social and economic impacts on impoverished populations, and affect their health and food security.

In recent decades, Bolivia has suffered extreme weather events such as floodings, severe droughts, forest fires, and loss of water reservoirs that impact on the people's survival and responsiveness, and have exacerbated existing vulnerabilities. A 2011 UNDP study extracted data from EM-DAT³ (1900 to 2010) showing the ten worst weather disasters that have taken place in the past three decades in Bolivia. The same database shows that droughts, floods, extreme temperatures, and catastrophic landslides have increased in frequency in recent years (UNDP 2011: 45). Records show that between 2000 and 2009, 911 people died and over 2,000,000 were affected by natural disasters. In lowland areas, extreme events such as storms, droughts, high winds, and flooding, led to significant economic losses, particularly in agricultural and livestock production. They also led to the damage of infrastructure and the emergence of infectious diseases (MMAA 2009; Githeko et al 2000 in Baudoin, 2012: 6).

The Indigenous People and their Vulnerability

The indigenous communities depend on natural resources for their subsistence and are, therefore, the most vulnerable to climate change. While people living in marginal lands have always been exposed to various types of environmental change and have developed strategies to address them, it is likely that this valuable knowledge of adaption is outweighed by the future risks that climate change will bring.

Using documents related to policies on climate change, including the Stern report and the Fourth Assessment Report of the IPCC 2007, (Oviedo 2008) asserts that those who will most suffer the consequences of climate change will be the poorest and most vulnerable communities in the world, including the indigenous

and traditional people. Confronting climate change, the indigenous people are in a vulnerable position (defining vulnerability as the inability of the poor to manage risk). In general, the most vulnerable people face risky conditions to cover their basic needs which are highly sensitive to climate change (water, food, health) (UNDP 2011: 45).

Hampson distinguished in his report to the Commission on Human Rights 1998-2007, three levels in which indigenous people have their rights affected by environmental damage, and specifically climate change:

- i) Damage that adversely affects their territories, such as biodiversity loss and water scarcity.
- ii) Displacement – being forced off their land to other regions of the *same* country because they can no longer make a living in their territory. In addition to the physical loss of land, it may also involve losing their inalienable right to it especially if it is being colonised and no longer made consistent with their traditional habitat (condition is stipulated, in many Latin American constitutions, as a prerequisite for the right to own land).
- iii) Displacement – being forced from their lands and fleeing to *another* country or location. It is feared that, in this case, they lose all their rights as an indigenous people, under which, according to the ILO Convention 169 they would no longer be indigenous, but an ethnic minority in a foreign country. Would they still be entitled to exercise their rights in their home country? What territories can the landless claim? What rights do they have? Under whose authority can they assert their rights? These questions are particularly topical for the people of the Caribbean islands threatened by floods (Feldt 2011: 5)

For these reasons, the indigenous peoples demand the recognition of their rights to land, consultation, participation even in the context of negotiations about climate; and that in the context of these negotiations their rights may prevail over other interests (Feldt 2011: 5).⁴

Oviedo (2008) notes that exposure to the impacts of climate change depends on where people choose or are forced to live. Indigenous people often live in difficult, fragile, and isolated places that make them vulnerable. Likewise, indigenous communities are dependent on materials and natural fibres to meet their needs for food, timber, fuel, generation of income, medicine, and for spiritual purposes. It is estimated that climate change will alter the availability and distribution of these resources. Similarly, floods and droughts have negative effects on crop production and also reduce the supply of fuel and water. Not to mention, climate change acts as a stressor on indigenous people and limits their ability to cope. Finally it is noted that climate change will further weaken the health of millions of people. Indigenous groups could be exposed to greater health risks related to water quality, or infections such as dengue and malaria.

The Amazon, Home to Indigenous Groups

One area that has received considerable attention has been the Amazon, mainly because it is one of the areas with the highest diversity of species on the planet. The impact of global change, however, is different within different ecosystems even within the Amazon itself. Bolivia is located on the southwest border of the Amazon, in a transition area to southern temperate ecosystems. Some estimations consider, for example, that this is precisely the region that will receive the greatest impact of global change, such as the shrinking of glaciers in the Andes (Francou et al 2005; Soruco et al 2008; Chevallier et al 2011).

Different predictive models of change in temperature and precipitation under different climate change scenarios indicate a trend towards loss of humidity in certain regions. The Amazon region is considered to be at particular risk, especially when one includes the impacts of increased land use. Regional models suggest a further increase of temperature in the Amazon because of substantial losses of the Amazonian rainforest and other vegetation that impact on the climate of the region due to reduced evaporation rates and changes in the precipitation regime (Cox et al 2000 in Baudoin 2012: 70) and because of global causes as the increased carbon dioxide and other gases such as nitrous oxide and methane (Alencar et al 2006 in Baudoin 2012: 70). Also, increased temperatures and decreased precipitation could increase the frequency of droughts in the Amazon, with negative effects on vegetation: the replacement of relatively fire resistant vegetation by other species that are highly flammable, producing more frequent and extensive fires.

Jong and Mery (2011) have pointed out the concern about the future of the Amazon region, the integrity of its forests, other ecosystems, and the welfare of rural populations, especially indigenous and other traditional peoples, because of the threats of climate change and food security problems.

Having briefly reviewed the relationship between climate change and indigenous people, we will now focus on Beni, where flooding had been strong and excessive in 2014.

Beni and the Amazon

Beni is one of the fragments of Bolivia which is part of the Amazon. It has an extraordinary exuberance; a variety of flora, fauna and social diversity (sixteen indigenous communities live in this territory). In 2014, Beni bore the brunt of the incoming rains, reporting a historical increase on inland precipitation.

Diversity is expressed, for example, in the entire plains of Beni, including the adjoining woodland which is home to about 5,000 plant species, and the savannahs themselves, containing 1500 of these species (Beck and Moraes 1997). In the floodplain of the central region of the Mamore River, the presence of about 900 species (Beck and Moraes 2004) has been reported. In summary, the plains of Beni

show an interesting range of plant species and sub-formations, transforming it into a unique and valuable area (Baudoin 2012: 14).

Beni is characterised by a particular geomorphology with very little inclination, so it is subject to small annual flooding or large floods every few years that can even cover it almost entirely (Baudoin 2012: 11). This area, in particular, is regularly affected by seasonal floods, fires and droughts that have much to do with global, climatic phenomena: El Niño and La Niña. During the wet season the water supply of the upper watershed of the Mamore and Beni, in addition to local rains, brings a build-up of rivers and flooding of a large proportion on the area. Moreover, during the dry season, there are frequent wildfires caused mainly by the burning of grasslands, which are used as food for cattle to stimulate regrowth, and also to enable land for farming or livestock grazing.

There are complex social, economic, and environmental interactions that influence the vulnerability of the Beni population to cope and recover from natural disasters. Some determinants are: environmental degradation, poverty, and social inequality (ISDR 2001; Thomalla et al 2006; Oxfam 2010; Baudoin 2012: 8).

Social Diversity and the Presence of Indigenous People in Beni

Currently, Beni has a total population of 422,000 inhabitants. The indigenous population is around 105,000. Although it reduced indigenous population, 16 of the 36 indigenous groups of Bolivia live in el Beni.

Formerly, the population of Beni consisted of a large number of ethnic groups that were traditionally integrated into the scheme of the Jesuit reductions in the early seventeenth century. This historic event determined most of the current characteristics of the local population and the distribution of the main population clusters. Since the early nineteenth century a successive flow of immigrant traders and pioneers began to settle around the indigenous areas and were supported by unequal trade and trade-off relationships which began to concentrate resources by legal and illegal means. Also, due to issues related to the high mobility of the indigenous population, its territories were considered vacant land and gradually became the domain of cattle ranch owners (Urioste and Pacheco 2001: 105).

The process of penetration of livestock which was progressively moving indigenous communities to smaller and smaller areas, relinquished the indigenous control of livestock production. This has defined major social, cultural, and economic contrasts. A set of conflicts between the indigenous population and the farm owners by the overlapping of property rights remains unresolved. The indigenous population is completely surrounded by cattle ranches.

Beni is an excellent region for rearing livestock with ranching characterised by the use of large amounts of natural pastures requiring little capital investment (Urioste and Pacheco 2001: 142). Meat supplies to the domestic market have determined the economic landscape of this region. Despite the favourable conditions

mentioned above, the region has some disadvantages that threaten the stability of this production due to temporary and permanent flooding, as well as the limited availability of offshore areas for livestock protection when such natural phenomena occur (Urioste and Pacheco 2001: 105). For example, within the regional economic dynamics, a division of activities among social parties has appeared. For one thing, the doomed livestock farmers, indigenous people, and peasants have devoted themselves to the development of farming systems on the small-scale, thus allowing them to meet their subsistence needs.

We now focus on these two groups in order to see their interaction on the land.

Indigenous Groups and their Concept of Territory

Access to the property rights of indigenous territories in the Bolivian Amazon is irreversible. Positive trends can be observed showing that indigenous people and traditional communities have increased their territorial control from the 1990s, having expanded forest conservation and biodiversity efforts (Jong and Mery 2011: 5).

However, extreme poverty and neglect of this population will not only change property entitlement but also not guarantee sustainable use of forests and all the natural resources of flora and fauna in the *Tierras Comunitarias de Origen* (TCOs).

A general observation of the indigenous groups in the region's lowland is that there are less and less hunters and gatherers; instead there are increasing numbers of unstable farmers. That is, their lifestyle change and sedentary work leads them to live in increasingly stable settlements. Thus the indigenous families spend more time cultivating their farms and, more recently, also raising cattle (Urioste and Pacheco 2001: XXXII).

Their economic activity (subsistence through small-scale agriculture, hunting, and gathering) and their social cohesion as indigenous communities leads them to conceive of the geographical space they inhabit as a territory, a 'big house', 'the mother', and an 'unlimited' space where they may move freely, looking for the everyday food. Given these conceptions, the territory is defended against external actors such as cattle ranchers with whom conflicts over land ownership remain unresolved and latent.⁵ Thus, it must be understood that the effects of disasters caused by climate change (floods and droughts) affect them directly in their subsistent economy. Two aspects should also be emphasised: (1) There is constant conflict between farmers regarding the definition of property ownership in the same space; cattle ranchers claim possession as individual property, and the indigenous as collective; (2) Cattle ranchers carry out activities such as *roza*, *tumba*, and burning which cause deforestation and climate change, thus bringing severe consequences on the indigenous population.

Ranchers and Deforestation

The rearing of livestock is concentrated in large and medium-sized properties. Farmers practicing livestock rearing are interested in the land, and the highest proportion of it. There is therefore both a commercial and maximum exploitation of the land. So the practice of *roza-and-burn* activities of cultivated areas are activities that increase with the agricultural season, in order to induce the regrowth of grasslands to feed the cattle and the elimination of weeds, or with the aim of enabling more fields of grazing. Fire is a low-cost tool, widely used for the management of grasslands and is employed in economic activities on as large a scale as subsistence.⁶ In this way, fires, once started, could become uncontrollable. The indigenous and peasant people argue that the damage fires bring to them include the loss of their crops almost in its entirety, the deterioration of the land, and the loss of grazing areas, affecting the agricultural practice with livestock rearing (Baudoin 2012: 57).

Livestock remains one of the most important, direct causes of deforestation in the Brazilian and Bolivian Amazon. Ranchers, whether on medium or large scale, are the principal parties responsible for transforming forests in pastures (Jong and Mery 2011:12).

Historic Flooding in the Bolivian Amazon: Live it to Tell it

Between November 2013 and February 2014, there were very heavy rains in the basin of the Beni River. Since November, the Abuná and Madera rivers were already at levels above the historical average and by early February they had already surpassed the historical maximum, and were expected to continue to rise even more (Molina y Bustamante 2014).

As of 1 February, the whole basin was saturated and by 15 March the water level was still rising. Under such disastrous conditions, in February 2014 several municipalities in Beni called a hydrological red alert. The municipalities affected were: San Ignacio, Santa Rosa Yacuma, Trinidad, San Borja, and Rurrenabaque Reyes. In Beni alone there would have been 3,957 families affected, in addition to 140 acres of crop losses and 218 families left homeless as a result of flooding⁷ (Humérez 2014; Izurieta 2014).

In the affected areas, the population is beginning experience a growing shortage of food and water, while being isolated in the Northern Amazon due to the bad state of the roads and highways. It was predictable that the prolonged flooding would generate outbreaks of disease, a change in soil composition, migration of animal species, and altering geography plus population displacement. Beni was in a state of emergency and alert which caused families to evacuate their homes. In the region of *Territorio Indígena Parque Nacional Isiboro Sécura* (TIPNIS), 100 per cent

of communities in the area were flooded and residents were forced to live above two metres of water, either by barge or in the few spaces high enough to be free of the flood water. The desperate population called for greater attention to be paid to the lack of food and clean drinking water, as well as the spread of disease and the loss of almost all their cattle (24/02/14 ERBOL in Humérez 2014).

Causes of the Flood

An Already Changing Climate in Beni

Based on a study that took place between 2000 and 2011, it can be said that in Beni there has been an increase in total annual precipitation during the eleven years of study. In 2000, the total average annual rainfall was 944.8 mm, while in 2007 and 2011, a sharp increase of 168 mm was recorded which was above average. The meteorological records show that, by far, 2007 and 2009 were the wettest years, with precipitation of 1,541 and 1,814 mm / year registered, respectively (Baudoin 2012:28).

In Beni, an average of 59 days of rain/year in the 2000s was recorded. Climatic data shows a general trend of increase by 10 days of rain in the last five years. Between 2000 and 2005, it rained 48 days on average, while in 2006 and 2011, it rained 58 days. 2009 was the year it rained the most, recording a total of 72 days of rain. There was little change recorded with the number of days of thunderstorms during the eleven years of study, keeping close to the average at 37 days (Baudoin 2012:29).⁸

The results show variations in the flooded area between 2004 and 2011. On average the flooded area in the department of Beni covered about 6,000,000 hectares. The years in which the greatest amount of flooded areas during the wet season was recorded were 2004, 2006 and 2008, when approximately 12,000,000 and 9,000,000 hectares were covered by water due to overflowing rivers in the Amazon basin (Baudoin 2012: 46).

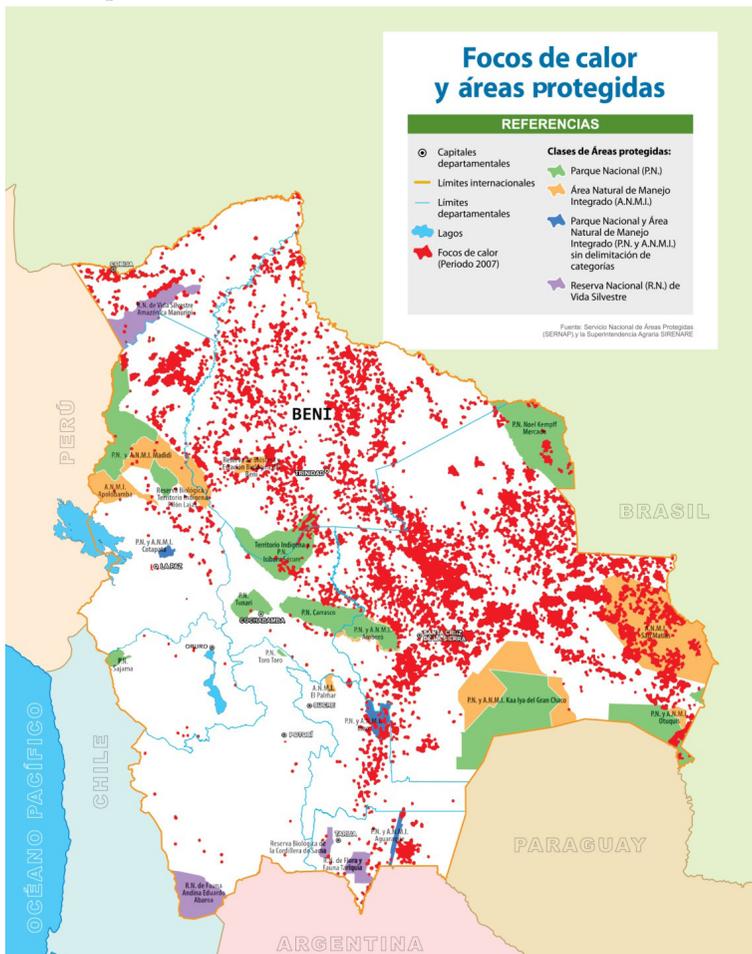
Moreover, the region is characterised by hot spots, which are related to deforestation.⁹ Most fires occurred in the municipalities where the savannahs predominate.

Beni has the second largest number of hot spots in Bolivia during the dry season.¹⁰ In July 2010, the SENAMHI¹¹ reports that Bolivia was the second country with the most hot spots in South America, coming only after Brazil. In August 2009, ABT¹² reported that Beni had the highest incidence of hot spots in the country, and was expected to move from orange to red alert due to an increased level of fires. The fires covered one million hectares of Bolivia. The year 2010 ended with the declaration of el Beni as an emergency zone due to drought and the fires that affected it. This declaration was maintained at least until March 2011 due to natural disasters caused by heavy rains brought by the La Niña. There were two abnormal droughts,

independent of the El Niño drought, which affected the Amazon region in 2005 and 2010. Both years were particularly hot and dry. Bolivia's government declared a state of emergency in Beni in both 2005 and in 2010, the worst ranking drought since 1963 (Oxfam 2009, in Baudoin 2012: 63-65).

Owing to the high rainfall during the wet season, the region experiences annual flooding that can even extend right into the dry season (Costas and Foley 2002). In 2009, there was particularly wet and heavy flooding in the Amazon region, to the point that some authors categorised the event as one of the worst floods in the last fifty years (Chen et al 2010 Baudoin 2012: 69). And surely the floods of 2014 would be considered exceptional in the last half century.

Map 7.1: Hot spots



Source: CEDIB 2014

The frequency of droughts is expected to increase in the region as a result of deforestation and climate change (Williams et al 2007; Malhi et al 2002 in Baudoin 2012: 70).

Thus, we note that the flood of early 2014, an unprecedented extreme in history, has its roots in climate change and had already been manifesting itself in the first decade of the century.

Deforestation

Bolivia is the fifth country with the most deforestation in the world. Deforestation and forest degradation occur in all forest ecosystems of Bolivia, especially in the Amazon, as Urioste (2010:3) notes.

Deforestation is the main cause for the emission of greenhouse gases and, hence, the effects of climate change in Bolivia. Following this is the most frequent cause of ecosystem degradation and loss of natural capital at a rate unprecedented in Bolivian history.¹³

In Bolivia, there is a deforestation rate of 350,000 hectares per year, but in per capita terms 320m²/persona/yr, resulting in a 20 times higher rate than the global average (~16 m²/persona/yr) and is the highest in the world, surpassing the levels of other major deforesting countries. In lowlands, deforestation processes are responsible for 95 per cent of biodiversity reduction, while climate change is only responsible for 5 per cent. An expected deforestation of 33 million hectares by the end of this century means the emission of 8 billion tons of CO₂ (Urioste 2010 : 3).

The rapid increase in the frequency and intensity of fires in the Amazon has become an environmental issue, creating political and social pressure on governments to regulate the use of fire and reduce deforestation rates in the Amazon forests (Baudoin 2012: 7).

The growth process of *tumba* and burn, reflects a dramatic increase in forest clearings, parallel to major advances in agricultural frontiers for agriculture and livestock¹⁴ (Goitia 2014: 10).

Brazilian Dams

A third cause of the floods this year falls on the two mega-dams in Brazil, Jirau and San Antonio. As Goitia (2014: 10) points out, the floods caused by water retention in dams built in Brazil, and near the border with Bolivia, will have a permanent effect, causing further loss of forests, destruction of man-made infrastructure, impacts on livestock, flora, fauna and wildlife, and impacts on human life.

Both dams began operating at their highest level, and coincided with extraordinary rains. In an area where this is uncommon, putting up a wall (construction of dams), and generating a decrease in water velocity is a monumental blunder (Archondo 2014: 4; Interview with Molina, Patricia).

In Brazil, they had already made modulations for average flow. The average flow is somewhat less than 35,000 cubic meters per second, and they were able to model up to 40,000 or 45,000, meanwhile flow this year reached 56,000 cubic meters per second or more. Their model could not measure the extent of the disaster (Archondo 2014: 5; Interview with Molina, Patricia).¹⁵

Note that in 2007, the Brazilian Institute of Environment (IBAMA) indicated that dams on the river Madera would have direct or indirect impacts on Bolivia (Medina 2014: 4-5).

Consequences and Conclusions

We began this chapter by noting that the effects of climate change in the Bolivian Amazon have their cruellest repercussions on the indigenous population. Amazonian families feed off birds and forest animals that are sources of protein of animal origin and complementary to nutritional needs vital for food security, and floods of 2014 have caused the decrease of species such as jochi, fishing, the *anta*, the *chancho de monte*, the *huaso*, the kettle, and so on.

Intermediate cities received the migration of rural residents affected by flooding and the outskirts of these cities are going to swell in numbers, increasing underemployment, forced labour, and begging, as the migration of the Sirionós to the city of Santa Cruz has forced people to beg.

As Cuellar (2014:9) points out, the damage to the mud houses or thin wood are irreversible. Approximately 5000 families across the region of Beni and the Northern Amazon have been left homeless.

Four fish species will go into extinction, known as ecocide, because the fish cannot spawn in the Amazon because of the presence of dams. (Interview with Teresa Flores 2014). Ramos said that some 650 fish species will disappear, affecting the fishing capacity of the region and the livelihoods of local communities, who will have to change their diet (2014: 7). Potential impacts on human health and proliferation of malaria (Medina 2014: 4-5 and Ramos 2014) were also detected.

In short, the indigenous people of the Amazon cannot face extreme situations like the floods experienced in 2014. The facts show that each time their communities are flooded, they are virtually left with nothing; they are left with an empty pantry, living each day as it comes from nature.

In the Amazon, everything should be done to reduce deforestation because by its nature, forests provide important environmental services, mitigate greenhouse effects (GHG), including carbon dioxide and others. They also maintain valuable biodiversity in the world of flora and fauna, and contribute to a decrease in global warming. These are the reasons why those parties who live off the land for commercial endeavours, should be regulated by the state with more drastic laws, otherwise the country is going to experience many more disasters such as those endured in 2014.

Several forces are shaping the Amazon region. Persistent deforestation, land degradation, poverty, and violence regarding land appropriation. Thus, these aspects mark an inequality and in the context of disasters this becomes even deeper.

Notes

1. At the national level, the media reported 59 deaths, 146 municipalities and around 60,000 families affected in addition to 110,000 heads of cattle lost.
2. Clearing land (covered by forest and vegetation) by burning the forest and vegetation cover in order to prepare the land for pastures.
3. Emergency Disasters Database
4. This is based on the ILO Convention 169 of 1989 concerning Indigenous and Tribal People, and the Declaration of the Rights of Indigenous People, adopted by the General Assembly of the United Nations in 2007. Both the ILO Convention as well as the Declaration of the United Nations establish the right of the indigenous people to self-determination and the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired. The Declaration of the United Nations recognises the right to free, prior and informed consent on all projects affecting their territory (Feldt Heidi 2011: 5).
5. Broadly, this theme is developed in Canedo, Gabriela (2011) *La Loma Santa, a gated utopia. State, Territory and culture in the Bolivian Amazon*. IBIS-Plural, La Paz.
6. See José Martínez et.al 2003 *Fire in the Panatanal. Forest fires and loss of biodiversity resources in San Matías-Santa Cruz*, PIEB, La Paz.
7. At the national level, reports point to 59 deaths, 146 municipalities and around 60,000 affected families. In addition, and according to the latest report of 17 February by the Ministry of Rural Development and Land, 110,000 heads of cattle have been lost in the municipalities affected including a loss of approximately 39,000 hectares of crop (Humérez 2014).
8. According to Jean Luc Bourrel (1999) the dynamic of floods are considered to be of two types: the endogenous and exogenous, depending on rainfall originating from the floodplain or outside area, respectively. This feature makes the flooding process dependent on the distribution of rainfall in the upper basin (in mountains or foothills) or lower part of the basin (local rainfall in the plain). Depending on whether the rain came from the top or bottom, the hydrological response will be different. A third situation occurs when precipitation originates in both the top and the bottom, resulting in extreme flooding. On the other hand, according to Josaine Ronchail, generating floods in Beni is also dependent on other factors such as the degree of saturation of the soil: precipitation within normal values can produce extreme flooding if in the previous year there was saturation of the soil (Baudoin 2012: 7-8).
9. In reality, fire has always been associated with the dynamics of some ecosystems. For instance, throughout the world savannahs have always been associated with fire, be it of anthropogenic origin or not (Baudoin 2012: 10).
10. Points of forest fires.
11. Servicio Nacional de Meteorología e Hidrología (National Meteorological and Hydrological Service).

12. Autoridad de Bosques y Tierras (Forest and Land Authority).
13. Globally, about 13 million hectares of tropical forests – that is, an area the size of Nicaragua – are lost each year to be converted to other uses. This loss represents a fifth of total global carbon emissions, which is why deforestation is considered the second most important factor of global warming. Consequently, forest conservation plays a vital role in any initiative to combat global warming.
14. In 1995 after the development of the forest map of Bolivia 53.4 million hectares was established. The deforestation was 168,000 hectares per year. In 2003 the estimated deforestation had exceeded 300,000 hectares per year and by 2010 forest loss stood at 400,000 hectares (Goitia 2014).
15. See Lanza, Gregorio; Arias, Boris 2011 Represa Cachuela Esperanza. Posibles consecuencias económicas y ambientales de su construcción. CIPCA, Cuadernos de Investigación 74, La Paz.

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